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STATE OF WYOMING

State Engineer's Report

1919-1920

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BIENNIAL REPORT

OF THE

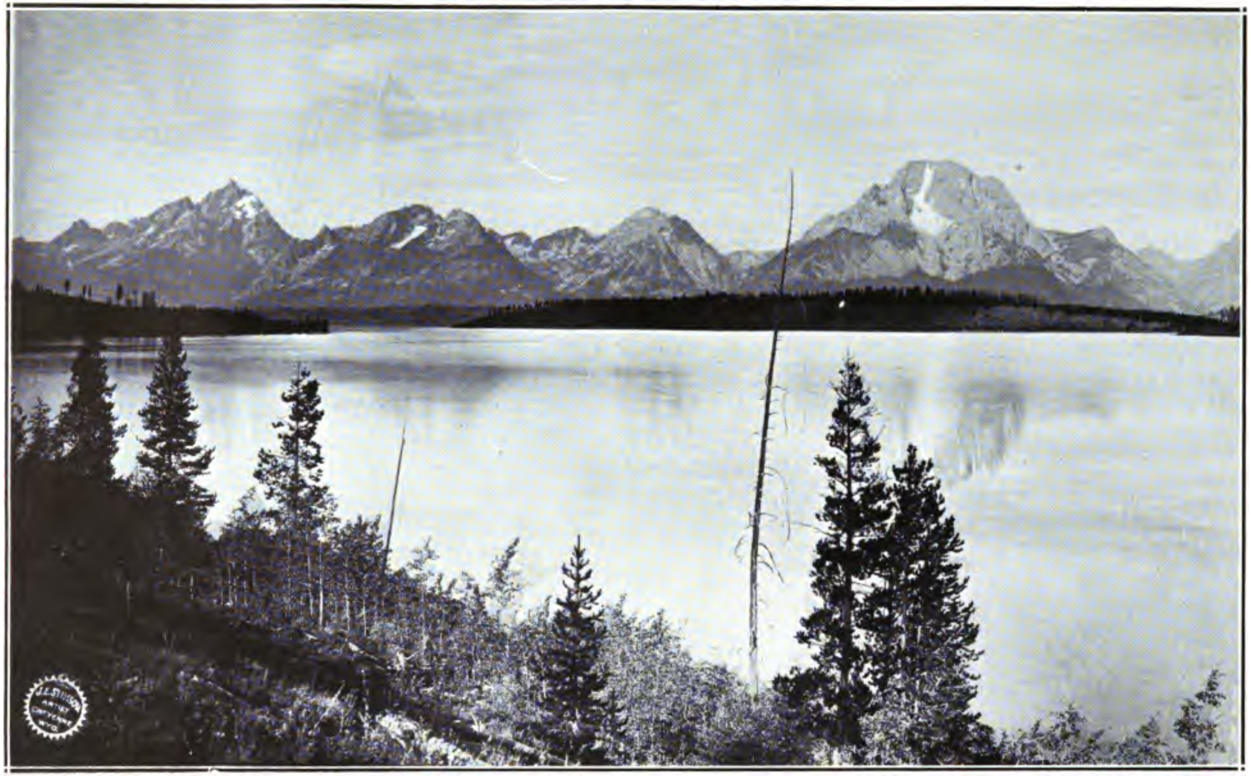
STATE ENGINEER

TO THE

GOVERNOR OF WYOMING

1919-1920

LARAMIE, WYOMING:
THE LARAMIE PRINTING COMPANY
PRINTERS AND BINDERS
1921



Jackson Lake Reservoir and the Tetons

LETTER OF TRANSMITTAL

To the Honorable
ROBERT D. CAREY,
Governor of Wyoming.

Sir:

In accordance with the provisions of Section 155, Chapter 19, Wyoming Compiled Statutes, 1910, I have the honor to submit herewith the report of this Department for the last biennial period. A general review of matters of current interest, together with recommendations as to needed legislation is also included.

Respectfully,
FRANK C. EMERSON,
State Engineer.

Cheyenne, Wyoming, November 30, 1920.

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OFFICERS

Having in Present Charge the Administration of
the Irrigation Laws of Wyoming

STATE ENGINEER'S OFFICE

Frank C. Emerson	State Engineer
Henry G. Watson	Deputy State Engineer
Seymour S. Sharp	Assistant State Engineer
Robert C. Duthie	Field Assistant Engineer

BOARD OF CONTROL

Frank C. Emerson, State Engineer, Cheyenne	President
L. C. Bishop, Douglas	Superintendent Water Division No. 1
C. W. Stroud, Sheridan	Superintendent Water Division No. 2
Lou Blakesley, Basin	Superintendent Water Division No. 3
M. I. McCuaig, Evanston	Superintendent Water Division No. 4
Julia Bartlett Freeborn, Cheyenne	Secretary

WATER COMMISSIONERS

DIVISION NO 1.

Fred W. Hirsig, Cheyenne	District No. 1
C. C. Donahue, Little Horse Creek	District No. 2
	District No. 3
George N. Grant, Millbrook	District No. 4
George N. Grant, Millbrook	District No. 5
A. J. Kennaday, Saratoga	District No. 6
Roy C. Peck, Saratoga	District No. 7
George L. Gideon, Baggs	District No. 8
	District No. 9
Emil Jamerman, Split Rock	District No. 10
J. H. Frederick, Casper	District No. 11
Alvy Dixon, Rock River	District No. 12
	District No. 13
	District No. 14
John N. Stinson, Douglas	District No. 15
Harry C. Young, Glenrock	District No. 16
D. F. Sommer, Grant	District No. 17
A. L. Bishop, Sr., Marshall	District No. 18
	District No. 19
J. H. Frederick, Casper	District No. 20
Harry C. Young, Glenrock	District No. 21
Frank Cowder, Leo	District No. 22
Fred Roediger, Glendo	District No. 23
Raymond Ault, Saratoga	District No. 24

DIVISION NO. 2

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Fred Firnekas, Buffalo	District No. 3
G. C. Morrow, Sheridan	District No. 4
Ben Ketchum, Dayton	District No. 5
Andrew Hoaglan, Parkman	District No. 6
W. D. Roadefer, Sundance	District No. 7
Ross Sackett, Mayoworth	District No. 8
Fred Todd, Ucross	District No. 9
	District No. 10
	District No. 11
	District No. 12

DIVISION NO. 3

Rhinehart Kritz, Lander	District No. 1
Walter Thiess, Lander	District No. 2
	District No. 3
A. Ray, Lucerne	District No. 4
Thomas E. Robinson, Thermopolis	District No. 5
Morrel Wyman, Tensleep	District No. 6
K. K. Kimbro, Greybull	District No. 7
S. T. Johnson, Burlington	District No. 8
L. W. Pearson, Cody	District No. 9
George L. Berry, Clark	District No. 10
George W. Woolf, Lost Cabin	District No. 11
E. M. Ilg, Hyattville	District No. 12
John Arundel, Worland	District No. 13
	District No. 14
Fred Bonar, Himes	District No. 15
Charles J. Granger, Pilot	District No. 16
John M. Waugh, Winchester	District No. 17

DIVISION NO. 4

Charles Teters, Rock Springs	District No. 1
Albert Mau, Cokeville	District No. 2
Joseph W. Field, Lyman	District No. 3
David Dean, Evanston	District No. 4
Frank J. Pomeroy, Fontenelle	District No. 5
E. J. Meyer, Farson	District No. 6
B. N. Tibbals, Boulder	District No. 7
B. O. Gardner, Afton	District No. 8
George B. Hand, Kemmerer	District No. 9
Orland Black, Big Piney	District No. 10
Clate Stacey, Merna	District No. 11
George Weigand, Pinedale	District No. 12
	District No. 13
O. P. Williams, Jackson	District No. 14
	District No. 15
Roy B. Perkins, Burnt Fork	District No. 16
Joseph A. Skinner, Bedford	District No. 17

Note.—This list of Commissioners is not complete, although the best available at this time.

State Engineer's Report

By FRANK C. EMERSON, State Engineer

INTRODUCTORY

It is provided by law that "The State Engineer shall prepare and render to the Governor, biennially, and oftener if required, full and true reports of his work, touching all the matters and duties devolving upon him by virtue of his office."

Scope of Report. An examination of the statutes will show that the duties of the State Engineer cover a wide and varied field in connection with the disposal and use of the public waters of the State. As President of the Board of Control, the State Engineer has general supervision of the extensive work of the Board. Many other duties devolve upon him by virtue of his office. To fully cover all phases of the work of this Department would call for a voluminous report hardly warranted in the circumstances. It is, however, the purpose of this report to present, as fully as consistent with the funds available, a general survey of the activities of the Department during the last biennial period, including such tabulations of records as seem essential; and also to present such matters coming within the jurisdiction of the office as are of deep public concern. It has been the endeavor to make this report readable enough to hold the careful attention of everyone interested in irrigation development, upon which is based a large share of the welfare and prosperity of Wyoming.

Make-up of Report. This report may be considered as consisting of three main parts, viz:

First. A general review of different features concerning the activities and interests fostered by this Department, together with recommendations as to needed legislation.

Second. Reports of various officers having in charge different phases of the work.

Third. Tabulations, in the form of supplements, of certain records and data obtained. "Supplement A" sets forth permits to appropriate water issued during the two-year period. "Supplement B" presents summarized data of stream flow obtained during the same period. Either or both supplements can be obtained upon request.

SUMMARY OF PERMITS ISSUED AND FEES RECEIVED
October 1, 1918, to October 1, 1920

PERMITS ISSUED

Originals	
Number of ditch permits	591
Number of acres to be reclaimed	31,884.32
Number of miles of canal construction required	723.89
Total estimated cost of construction	$1,315,115.00
Enlargements	
Number of enlargement permits	183
Number of acres to be reclaimed	23,062.49
Number of miles of canal construction required	158.07
Total estimated cost of construction	$ 665,905.00
Reservoirs	
Number of reservoir permits	160
Number of acre-feet of water to be stored	150,902.52
Total estimated cost of construction	$2,439,337.50
Totals	
Total number of permits issued	934
Total number of acres to be reclaimed	54,946.81
Number of miles of canal to be constructed	881.96
Total estimated cost of construction of engineering works	$4,420,357.50

FEES RECEIVED

Filing Fees	$ 2,290.00
Certified Copies	2,118.90
Miscellaneous Recording Fees	554.35
Uncertified Copies of Office Records	242.30
Issuing Special Certificates	48.00
Attaching Special Certificates	36.00
Proofs Submitted	1,138.00
Contest and Abandonment Case Fees	72.00
	$ 6,499.55

DEVELOPMENT

Direct Flow Permits. The preceding table discloses the fact that again there has been a decided decrease for a two-year period in the number of permits issued for direct flow rights. This is a very natural development as the possibilities for small projects, which constitute the great majority of filings, have gradually been reduced through the years. The waters of most streams of the State have been largely appropriated for the low water period, and development of the future must more and more depend upon larger projects and the supplement of direct flow rights by the storage of water in reservoirs. It is also true that the labor and financial situation has not been conducive to development during the past two years.

Reservoirs. Permits issued for reservoirs show a small gain in numbers and a decided gain in the amount of storage proposed. The principal cause of the quickening of interest in reservoirs was the short water supply over the State during the 1919 irrigation season. Direct flow rights that had before seemed adequate were in many cases without water during this season. Heavy losses by crop failures in different sections resulted, and forcibly called the attention of water users to the need of conservation of water by storage during the spring flood period to supplement the season of low stream discharge during July and August.

Although the 1920 season was one of comparatively ample water supply, the lesson of the previous season has fortunately not been overlooked. The heaviest loss in the State, as a result of the water shortage of 1919, occurred on the Greybull River, an important stream in the Big Horn Basin. To prevent a recurrence of such losses upon the Greybull, plans proposing to store about 92,000 acre feet of water in two reservoirs on a tributary of this River are well under way. The Leiter Estate also suffered a large crop loss on their extensive holdings on Clear Creek by reason of the dry season of 1919. As a result, these interests have undertaken the Lake De Smet Reservoir Project, near Buffalo, and have prosecuted actual construction work on a considerable scale during the past year. This reservoir will furnish stored water for use on Lower Piney and Clear Creeks, and probably eventually for certain lands on Dutch Creek.

Progress. Although it is true that there has been the noted decrease in the filings of new projects, it is equally true that more actual work has been accomplished during 1920 towards irrigation development in general than during any season since 1912. The U. S. Reclamation Service has continued its work on a substantial scale on the Shoshone and North Platte Projects, and initiated work on the Riverton Project. The last few years have so well demonstrated the values of the irrigated lands of this State that, despite other conditions that have been a serious handicap to further development on a large scale, we find the past year has shown much progress in connection with Carey Act projects. Improvements and extensions on a considerable scale have been prosecuted during the year on the Lakeview Project near Cody, the Hawk Springs Project in the Goshen Hole, the Wyoming Development Company and the North Laramie Projects near Wheatland, and the Cottonwood Project on Green River. Practically all of the other large projects have performed betterment work of substantial character. A very healthy improvement and extension of the thousands of smaller projects in the State has been in keeping with the larger developments. The class of work found upon Wyoming projects as a whole will compare favorably with any in the West.

New Projects. While betterment and some extension work on several of the large projects has been proceeding continuously, it has been a matter of several years since actual construction work has been inaugurated upon any large new projects. During 1920, however, we find work started upon a substantial scale on the Lake De Smet Project and upon the Riverton Project of the U. S. Reclamation Service, as heretofore referred to, and on a smaller scale upon the Paint Rock Project in the Big Horn Basin. All of these projects were initiated years ago, but conditions have prevented the starting of actual development until this year.

Before—Desert Waste

After—Valuable Taxable State Assets

THE BEST ARGUMENT FOR STATE AID

STATE MUST AID

However encouraging the increased progress in irrigation development has been during the past year, it is still true that development in a large way, except that in connection with the projects promoted by the U. S. Reclamation Service, has been practically at a standstill for the last ten years. Wyoming is confronted with the necessity of taking adequate steps towards further active progress in a large way, if this State is to take proper advantage of our greatest natural resource. In the last analysis, agriculture will mean to Wyoming, as it always has to the rest of the world, the best basis for permanent prosperity. The raising of the products of the soil will only add to and increase our other enterprises, and in itself provide for Wyoming the most contented and prosperous citizenry.

Interstate Situation. While there are certain areas in Wyoming where dry farming can be very successfully undertaken, our greatest agricultural development must come through farming under irrigation. An abundant water supply is our greatest natural resource provided the same is properly used and safeguarded. Streams rise in Wyoming to flow from the State on every side. Keen interest is being evidenced by the surrounding States in the matter of irrigation development, and active steps are being taken to promote the same. When priorities to the right of using the waters of any stream are considered, State lines will be eliminated. Therefore, unless means are found to promote development in this State more rapidly than is now taking place, Wyoming will soon find itself denied the privilege of using a large part of the water that has its source in this State, the establishment of priorities in surrounding States having been accomplished by earlier development and use of water. As the situation stands today, Wyoming is in comparative apathy in consideration of the keen interest and active effort manifested in irrigation development by surrounding States.

Historical. Twenty-four years ago we find Elwood Mead making the following statements in his third biennial report: "Two things must be had if we are to reclaim our best land and use our large rivers. The first is State aid in building reservoirs and large canals. The experience of every irrigated country

has shown the necessity for state aid in building large works.
* * * Sooner or later there comes a time when the State lends its aid or development stops." Every State Engineer since Mr. Mead has recognized the need of state aid, but to date no action has been taken to adopt a plan.

In his territorial report of November 30, 1889, Mr. Mead speaks as follows: "The plateaus bordering on the North Platte, near Saratoga * * * are destined to undergo a marvelous transformation within the next few years, when the increase in transportation facilities through the territory makes these sections known to the world as they are to those who have examined them." "The valleys of the Green and Big Horn Rivers offer today the best opportunity for the construction of a system of irrigation works, according to a prearranged plan of any section with which I am familiar." The development that has taken place along the Big Horn River is a wonderful argument for irrigation, but we find that the span of thirty years has not found the visions of Mr. Mead as to larger developments on the North Platte and Green Rivers fulfilled. The possibilities, however, still exist. Can Wyoming longer afford to postpone the adoption of some plan that will inaugurate a substantial program towards the proper development of its unused water supply?

Finance the Question. Many feasible irrigation projects of much merit are found over the State. Several are well situated for early development. While it would be most unwise to promote work upon any project faster than economic conditions would warrant, steps should be taken at once to initiate progressive plans for development as conditions do warrant upon different projects. The time to start is now. Finance is at present the one great obstacle to be overcome. It seems impossible to overcome the disrepute that attached to irrigation securities by reason of the many failures of ten years and more ago. As a result, it is practically impossible to properly finance irrigation work today. This condition exists, notwithstanding the fact that the problems connected with irrigation enterprises are now well understood and all development in the future must be on a safe and conservative basis that will promise success.

A case in point, of the difficulty of selling an irrigation security, is that furnished by the experience of the Big Horn Canal Association. The Big Horn Canal covers a tract of about 25,000 acres of fine land, mostly in a high state of cultivation, along the Big Horn River adjacent to the towns of Worland, Basin and Greybull. The character of work on this canal system will compare favorably with any in the West. To complete the rebuilding of a system of permanent structures of concrete, steel and other lasting materials, a loan of $100,000 was solicited. This amount represents a charge of about $4.00 per acre against land of average worth of $150.00 per acre. Only with difficulty was this gilt-edged security finally disposed of, and then at a discount of ten per cent, although but few if any offering of equal merit could have been found in any line of business in the country at the time. At the same time the bonds of drainage districts, under this same canal, were keenly sought for and sold at an average price of over 97. The drainage bonds, themselves a very good security, represented a charge of from $25.00 to $35.00 per acre against the land covered. The irrigation security, a $4.00 per acre liability, sold with difficulty at 90, while the drainage bonds, carrying a liability of more than $25.00 per acre, found a ready sale at over 97. In fact, the irrigation bond was fortunate in selling at all. The condition as attested by this example is true generally. That a remedy should be sought would seem to be recognized without question.

The State's Business. This problem of finance can well be overcome by some form of state aid whereby the State, without risk to its own finance, can adopt a plan that will provide for the financing of sound irrigation enterprises. This matter is essentially the business of the State, for it is believed that no other one thing can do as much to promote its interests. Applying water to the land transforms untaxed and unproductive areas into improved taxable state assets. Benefits will accrue to the State as a whole, and to every interest of the State. Better roads, better schools, better state institutions, and other material advantages to the State can be promoted in no better or surer way than by the creation of additional productive farm lands where now only worthless wastes exist. Who can know the great benefits that the areas farmed under irrigation have brought to the State without realizing what the future promises, if Wyoming now takes the steps that seem essential to gain proper advantage of the water supply nature has so generously provided.

There is no necessity for the State to undertake any work that does not offer a sound business proposition. From its different sources of revenue, Wyoming now has a considerable amount of money to invest, and this will be rapidly increased at least for the next few years. The State should place itself in position to invest its funds in conservative irrigation securities promising a full return with interest, and provide at the same time that necessary assistance that will create properties of immense value to the State.

Ways and Means. The assistance of the State can be given to private development by assisting private interests in disposing of their financial securities. This can be done by the State itself investing in the securities of sound projects, in whole or in part, or by certifying to the character of same. Participation by the State only to the extent of payment of interest on bonds for a short period after issue would give the bonds material aid toward disposal with the general investing public. In connection with these purposes, a State Board could be formed to thoroughly examine proposed projects from all standpoints, and give its approval to those meriting same. A Board composed of the Attorney General, Bank Examiner and State Engineer would be qualified to pass upon projects from the three main standpoints of legality, finance and engineering feasibility. By either of the plans suggested the State would aid toward the necessary financial assistance without detracting from the efficiency of private enterprise. Either of these plans could apply equally well to new projects or to improvement districts.

The States of Oregon and California have provisions in their laws for the certification of irrigation securities and payment of a certain amount of interest on same, that have operated very well in practice, and been the means of disposing of millions of dollars of bonds that would otherwise not have been marketable. The State of Montana voted on a constitutional amendment at the recent general election which would have provided a fund of twenty million dollars for investment by the State in irrigation bonds. This amendment was lost by a small margin, principally due to the nonpartisan vote and the fact that the importance of the matter was lost sight of to some extent in the frenzy of a presidential and gubernatorial election. Montana proposes to submit the same proposition at a special election and has no doubt of the outcome. It is a significant fact that while the irrigation bond amendment was lost by a majority of only seven thousand votes, the road bond amendment voted upon at the same time lost by thirty-four thousand. This is another indication that our neighbor on the north is keenly alive to the necessity of the situation. Unless Wyoming takes proper action, Montana, by providing a form of state aid, may be in position to "beat us to" much of the unappropriated water of the streams that flow north across the Wyoming line.

Wyoming could well undertake the development of new projects by a State organization functioning along the same lines as the U. S. Reclamation Service. Many feasible projects are to be found over the State embracing from 2,500 to 25,000 acres that could well be undertaken. Projects of this size would promise a quick turn-over and afford a good investment within the means of the State. The ultimate returns to the State, both directly and indirectly, could hardly be over-estimated.

U. S. Points Way. No better argument for the undertaking by the State on its own behalf of irrigation work is needed than the success that has attended the efforts of the Federal Government through the U. S. Reclamation Service along this line. The Arid States recognize more and more that the Federal Government is the proper agency to construct the great irrigation projects of the West. By virtue of its position near the headwaters of the great rivers, Wyoming is so situated that a large number of irrigation projects of medium size are found over the State. It is the development of this class of projects that the State can so well undertake within its means, continuing to look to the United States for the development of the great projects of 100,000 acres or more.

Need is Urgent. It is to be hoped that the treatment of this subject of State aid in connection with irrigation development will not be considered in the light of a needless alarm. This article has been a cold analysis of the situation as it appears to the writer after an active experience of sixteen years in all branches of irrigation work. The need of state aid is urgent and competent plans toward the end should be inaugurated by the coming legislature.

COOPERATION IN WEST

Agriculture is one of the main foundations upon which the industries and commerce of our Western States are built. Without irrigation, our most productive areas would be desert wastes. Recognizing the need of cooperative effort, in order to most efficiently promote the irrigation interests of the West, the several states have joined together in associations for the purpose of securing unity of effort. Wyoming happens to be in such position as to be a qualified member of the three main organizations.

Western States Reclamation Association. Upon the call of Governor D. W. Davis of Idaho, delegates from the thirteen arid states of the West convened at Salt Lake City in November, 1919. One hundred and fifty-six delegates representing the important irrigation interests in the different states, attended this convention. The organization of the Western States Reclamation Association was the result. The affairs of the Association are managed by an executive committee of thirteen, upon which committee Wyoming is represented by the State Engineer.

The present principal purpose of this organization is to secure the passage of a bill through Congress providing more funds for the work of the U. S. Reclamation Service. Much progress has been accomplished towards this end, and it is believed that before the 67th Congress adjourns a bill will be passed providing funds that will enable the Reclamation Service to considerably extend its activities. Wyoming will reap a material share of the benefits.

League of the Southwest. The Colorado River System drains seven states of the United States and completes its course by running fifty miles through Mexico. The water supply of this river is therefore a question of international as well as interstate aspect. The League of the Southwest is composed of the seven states, Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming, drained in whole or in part by the Colorado River System.

UM

The Harvest

The Harvest

The Green River, one of the main water supplies of Wyoming, is an important tributary of the Colorado. For economic reasons, the development of larger projects upon the Green River in Wyoming will proceed rather slowly. On the lower reaches of the Colorado River in California, Arizona and Nevada, much earlier development may be expected. A plan is now proposed to build the Boulder Canyon Reservoir to provide for the control and conservation of the water of the Colorado. This reservoir could be constructed to the immense capacity of 16,000,000 acre feet, this amount representing the entire normal annual discharge of the river. It is possible that the construction of this reservoir and early development on the lower river might seriously handicap the slower development we can expect on the upper river. This situation has led the different states to look with jealous eye upon developments in other states. One of the main purposes of the League of the Southwest is to formulate a plan whereby any legitimate development can proceed upon any section of the river without interference from other sections.

At the meeting of the League in Denver on August 28th of this year an Engineering Commission was formed, consisting of the State Engineers or similar officers of the seven states, and the Director and Chief Engineer of the U. S. Reclamation Service. The purpose of this Commission was to consider the possible projects of the different states and report a plan for the best utilization of the waters of the Colorado River System, with due regards to the rights and equities of all the interests involved. The report of this Commission would then form a basis for the consideration of commissioners from each State with the view to entering into a treaty between states. It is believed that only by early agreement between the different parties in interest in the Colorado River Basin can expensive litigation and unsatisfactory solution of the many difficult problems in connection with the use and disposal of the waters of the Colorado be prevented. Cooperation and mutual understandings are the worthy purposes of the League of the Southwest.

Northwestern Reclamation League. This League was formed at Seattle on the 17th and 18th of September of this year. The League is composed of five states of the Northwest, in whole or in part within the drainage area of the Columbia River. The purpose of the League is the promotion of irrigation interests in the Northwest. Its principal object at present is to supplement the work of the Western States Reclamation Association in its endeavors to secure additional funds for the work of the U. S. Reclamation Service. Each State in this League is represented by four directors. The Wyoming directors are Governor Robert D. Carey, the State Engineer, Hon. J. M. Schwoob, of Cody, and Hon. A. H. Ayers, of Riverton.

STATE INVESTIGATIONS

It is a very proper function of the State to determine the possibilities in the line of irrigation development. Competent data can thus be obtained concerning feasible projects, and any possible plan arranged for their development. The 1919 legislature appropriated the sum of $10,000 to be expended by the Governor of the State in making surveys and plans for irrigation systems for the reclamation of arid lands, and for other purposes connected with prospective irrigation development. The work for these purposes was performed under the direct supervision of this office.

Work Heretofore. The co-operative investigation of the State of Wyoming and the U. S. Reclamation Service upon the Green River, in accordance with the contract of 1915, outlined in a comprehensive manner the irrigation possibilities on that important watershed. In 1918 a second cooperative investigation was inaugurated by the State and the Reclamation Service upon the North Platte River. Valuable data obtained is on file in this office.

Casper Project. One of the outstanding questions relative to feasible projects on the North Platte was the possible large project north and west of Casper. Extensive areas of fine lands are found in this section, and an ample water supply for the irrigation of same is available from the river. In view of the questions arising on the North Platte it was considered advisable to make a careful investigation of a project that would mean so much to the State if found feasible.

This project has an interesting historical element. We find in the first biennial report of the State Engineer in 1892, statements as follows: "A canal has been surveyed to water the up-lands lying north and east of Casper. It contemplates the reclamation of over 250,000 acres at a cost of about two million dollars, and is the most important canal so far projected in the State." In the second biennial report of this office it is stated that surveys had been made and a permit issued for the Wyoming Central Canal, proposing to cover about 200,000 acres north of Casper at a cost of about two million dollars.

Despite the early interest manifested in this project there has been no development to date.

Progress in this State during the past twenty-five years, and the conditions generally at Casper by reason of extensive local development, have greatly enhanced the values of irrigated land in that section. The climatic conditions, the water supply and the character of the lands proposed to be irrigated make the possibility a most important one. This project would be a big proposition from every standpoint. The construction would be expensive and would provide many physical difficulties. The cost, however, would remain in such limits as would seem entirely justified by the great benefits that would accrue from the development.

Careful field investigations of the project were carried on through the summer under the direction of Mr. Robert C. Duthie. The preliminary estimates show that 125,000 acres of first-class land can be covered at an estimated cost of ten million dollars. The magnitude of the project, and the money required for its construction, make it more difficult to handle than would be the case of a smaller project. In the circumstances the most logical means of development would be through the agency of the U. S. Reclamation Service. This project could well form a unit of the general North Platte Project of the Service. The cooperative investigations have shown that there is a certain surplus of storage in Pathfinder Reservoir over the demands now made upon same. By reason of the conditions under which the Pathfinder permit was granted by the State, the Reclamation Service is under a moral, if not a legal obligation to apply any surplus waters in Pathfinder upon Wyoming lands.

Whatever may be the means to the end for development of the Casper Project, rather complete data will be available for use as a result of the State's investigation. The application for a permit covering over 140,000 acres under the Casper Canal has been regularly filed in this office.

Hanover Pumping Project. For some years much interest has been manifested in the possibility of irrigating an area of about 6,000 acres of fine land lying above the Upper Hanover Canal, near the town of Worland. By reason of the topography of the country, a gravity canal diverting water direct from the

Alcova Canyon—Proposed Diversion Casper Canal

Land Under Casper Project

Big Horn River is not feasible. It is practical, however, to pump water to this land with a reasonable lift from the Upper Hanover Canal. This project was investigated by Mr. Robert Kennedy, acting for the State, and a comprehensive report on same is filed in this office. It seems practical to provide power for this project from either one of the now developed or feasible proposed water power projects on the Big Horn River. It is estimated that the initial cost of the construction of the project and the installation of pumping equipment would not exceed sixty dollars per acre. The quality of the land is excellent and the water supply ample. The tract adjoins highly improved farms close to the town of Worland. These conditions would render the land readily salable.

Stream Flow Data. Water supply studies were conducted during the season of 1920 upon Tensleep, Paint Rock, Medicine Lodge and Shell Creeks, and upon the No Wood, Greybull and Wood Rivers in the Big Horn Basin; and upon Little Goose, Clear, Rock, French and Piney Creeks in the northeastern part of the State, for the purpose of determining the conditions relating to seepage and return flow upon these streams. This work has provided valuable data, both in connection with the present regulation of these streams and of water supply for further development from them. This work was performed under the direct charge of Mr. Robert Follansbee, District Engineer for the U. S. Geological Survey. A comprehensive report containing the valuable data obtained has been filed in this office.

United States Reclamation Service

Irrigation development may be accomplished through three general agencies, viz: The Federal Government, the State, and private interests. Through private enterprise the thousands of small projects in the State have been developed. In addition, many larger projects, principally under the provisions of the Carey Act, have been constructed by private interests as far as conditions have made development possible. The State so far has played its part only by encouraging development in a general way, and in outlining certain possibilities for development by the other two agencies mentioned. As has heretofore been pointed out in this report, the State must go farther if proper progress is to be made in developing our agricultural potentialities.

The Federal Government, through the U. S. Reclamation Service, is now constructing three great projects in Wyoming. As conditions have been decidedly against larger new developments by private interests, the Reclamation Service is the only agency that has extended to a material extent the irrigable areas of the State during the past few years. All the arid states of the West today recognize that the Federal Government is the proper agency for the undertaking of large irrigation projects. The great resources of the government are required in order to properly finance and promote projects of 100,000 acres or more. The benefits that accrue to the nation as a whole well warrant the development of such projects by the government itself. The ultimate development of the Shoshone, North Platte and Riverton Projects in Wyoming, as now under construction by the Reclamation Service, will cover areas of probably not less than 125,000 acres and may well run double this amount in each case. It is, therefore, readily seen that the work of this government agency is very important to Wyoming. Information concerning the Wyoming projects of the Reclamation Service, and progress during the past two years, is presented in the following by the respective project managers.

NORTH PLATTE PROJECT

By Andrew Weiss, Project Manager

The North Platte Project of the United States Reclamation Service embraces several independent units located on or near the North Platte River and dependent thereon for their irrigation supply. The units now completed, or under construction, are the Pathfinder Reservoir and the Interstate, Fort Laramie and Northport canal systems.

The Pathfinder Reservoir is a completed feature. It is formed by a granite masonry dam located in the channel of the North Platte River, about fifty miles southwest of Casper and three miles below the mouth of the Sweetwater River. Its capacity at spillway elevation, 5,852 feet above mean sea level, is 1,070,000 acre feet, at which elevation it submerges an area of about 22,000 acres.

The Interstate and Fort Laramie Canals divert on the north and south sides, respectively, from the North Platte River about 8 miles below Guernsey by means of a concrete overflow weir, averaging about 12½ feet in height above the original river bed, the weir being built on conglomerate rock and its overflow crest being 300 feet in length. It is supplemented by an earth dike 2,000 feet long, extending across the river bottom to the benches on the south.

The Interstate Canal covers a total irrigable area of about 130,000 acres on the north side of the river, of which 20,000 are in Wyoming. Its carrying capacity is 1,750 second feet. This is supplemented by two inland reservoirs of 12,000 and 65,000 acre feet capacity, respectively, supplying approximately 25,000 acres of land in the lower portion. This canal and distributing system were completed in 1915.

The Fort Laramie Canal is built with a designed capacity of 1,435 second feet, covering the bench lands on the south side of the river and lying above the private bottom land canals which, like the valley canals on the north side, were mostly built during the decade 1890 to 1900. The total area under the Fort Laramie Canal is something over 100,000 acres, a little over half of which is in Wyoming.

The main canal of the Fort Laramie unit is completed for the first 67½ miles from the headgate at Whalen to the crossing of Horse Creek about 10 miles south of Torrington. This includes the heaviest portion of the construction, the principal features of which are two tunnels, 2,750 and 2,150 feet long, respectively, one siphon under the Laramie River, one siphon under Deer Creek and heavy earth and rock cut sections, one of which, the Springer Cut, through the divide between Cherry Creek and Horse Creek, 55 feet in maximum depth, contained 1,250,000 cubic yards of material.

At the present writing approximately $3,400,000 have been expended on the construction of this unit, of which about $800,000 have been expended in Wyoming within the last biennial period. This expenditure has covered the completion of a power plant and transmission system of 1,000 horsepower capacity, the plant being located 5 miles southwest of Lingle, Wyoming, supplied from the Fort Laramie Canal, with an available head of 110 feet. The power is used principally for furnishing the necessary energy for the operation of four electric dragline excavators, which have been operating practically continuously since May, 1919, and have moved a little over 2,000,000 cubic yards of material to date. With these machines the Springer Lateral System, the Cherry Creek Drain, and portions of the Main Canal east of Horse Creek Crossing are now being built. Power is transmitted to these machines by means of approximately 40 miles of 33,000 volt transmission lines supplemented with 4,000 volt distributaries.

In addition to the operation of the dragline excavators, work has proceeded on concrete construction extending the lateral system to cover the entire Cherry Creek Valley, with the exception of a tract of public land of about 8,000 acres at its upper extremity.

At Pathfinder the installation of two additional regulating valves is in progress. These are designed to connect with the original emergency gates in the North Tunnel and will provide additional outlet capacity besides additional security of operation.

On the Fort Laramie Unit it is expected to proceed with the extension of the distribution system to cover the entire irrigable area in Wyoming during the next biennial period. It is also expected to complete the main canal from the crossing of Horse Creek to the Wyoming-Nebraska State line, inclusive of the cross drainage and regulating structures connected therewith. It is also intended to supplement the diversion works at Whalen with suitable sand sluicing devices as well as a service bridge across the river. This will involve an additional expenditure of approximately $1,000,000.

The first land opening within this unit was held March 5, 1920. It comprised 80 farm units, covering 5,079 acres of irrigable land, and entry privileges were by congressional resolution reserved for 60 days to ex-service men of the war with Germany. A total of 3,298 applications were received for these units, indicating an intense demand for lands of this class. An excellent type of settlers was secured. It is expected that a second opening will make a larger area of lands available in the fall of 1921.

RIVERTON PROJECT

By H. D. Comstock, Project Manager

The Riverton Project will irrigate a tract north of Wind River and west of the Big Horn River, lying wtihin the ceded lands of the Wind River Indian Reservation, constituting the major part of what was formerly known as the Wyoming Central Project.

The principal storage will be at the Bull Lake Reservoir. Secondary storage will be provided at Pilot Butte Reservoir in a natural depression near Pilot Butte. Complete designs for these reservoirs have not been prepared, but the sum of their feasible capacities will exceed the storage requirements of the project.

The principal source of water supply is Wind River, from which water will be diverted into the Wyoming Canal by a concrete dam at a point about 38 miles above Riverton, where bedrock is about 8 feet below river bed and where the north bank of Wind River leaves a sandstone cliff 100 feet high.

The first ten miles of the Wyoming Canal will have a capacity of 2200 second feet, the water depth being 10 feet and the bottom width in earth section being 65 feet. About three and a half miles of this division lies along a steep side hill where the bottom width will be reduced to 15 feet and the canal lined with reinforced concrete.

The irrigable area will be at least 100,000 acres. The soil ranges from a sandy loam to a clay loam and on an average is fairly heavy. Soil and climatic conditions are believed to be well suited for the production of alfalfa, cereals, potatoes, sugar beets and other vegetables. Sub-surface conditions are such that a considerable portion of the project will require protection from seepage and it is intended to construct the necessary drainage system as a part of the irrigation system. It is also intended to recover the waste and seepage water coming from the upper portion of the project and apply it to the lower lands of the project.

Preliminary investigations of the project were made by the Reclamation Service in 1916 and 1917. In May, 1918, Congress made definite provision for undertaking the project and in August of that year a force was organized for the prosecution of the work. Since that date detailed investigations have been made of the sites of Bull Lake Dam and Wind River Diversion Dam, the first ten miles of the Wyoming Canal has been located, and topographic surveys of the entire project have been completed. A warehouse with a gasoline storage tank has been built at Riverton; a construction camp, including a machine shop, has been built near the site of the head works. A permanent telephone line has been constructed from Riverton to this camp via Pavillion. Right of way has been purchased for the Wind River Diversion Dam. Two dragline excavators have been secured, each equipped with caterpillar traction, 50 foot boom, 1½ yard bucket, and 125 H. P. gasoline engine. These machines began excavation on the Wyoming Canal January 19, 1920. Since that date they have been operating on a steep side hill where the canal will be lined. Each machine is now being operated two eight-hour shifts. The total amount of material excavated up to October 31, 1920, was approximately 170,000 cubic yards, nearly all of which was sandstone, shale and heavy gravel.

Congress has made appropriations for the project in Indian Appropriation Acts as follows: For fiscal year 1919, $100,000; for fiscal year 1920, $200,000, and for fiscal year 1921, $50,000, and $100,000 was also appropriated from the Reclamation Fund for fiscal year 1921. It is not thought that any further appropriations will be made in the Indian bills but that all subsequent appropriations will be made from the Reclamation fund. Up to October 31, 1920, approximately $353,000 had been expended on the project, nearly all of which was in the last biennial period.

Further rate of progress will depend on appropriations available. It is planned to continue the construction of the first ten miles of the Wyoming Canal, to construct the Wind River Diversion Dam as soon as sufficient funds are available, and to begin the construction of the lateral system as soon as any irrigable land is reached, in order that water may be delivered at the earliest possible date. Sufficient natural flow of Wind River is available so that the construction of storage reservoirs can be deferred until the construction of the distribution system is well advanced. It is not thought that water can be delivered to any land prior to the season of 1924.

About thirty per cent of the lands of the project are in private ownership, the remainder being vacant public land which must remain withdrawn from entry until water is available. The date of any land opening will be widely advertised.

An irrigation district is being organized covering the private land and the adjoining public land in order to take advantage of the Smith Act in cooperating with the United States for the construction of the project. A petition for such organization is now being circulated and it is believed that the requisite number of signers will soon be secured. As sixty per cent of the owners of private land are non-residents of the State, the securing of these signatures is requiring considerable time.

SHOSHONE PROJECT

By I. S. Longwell, Project Manager

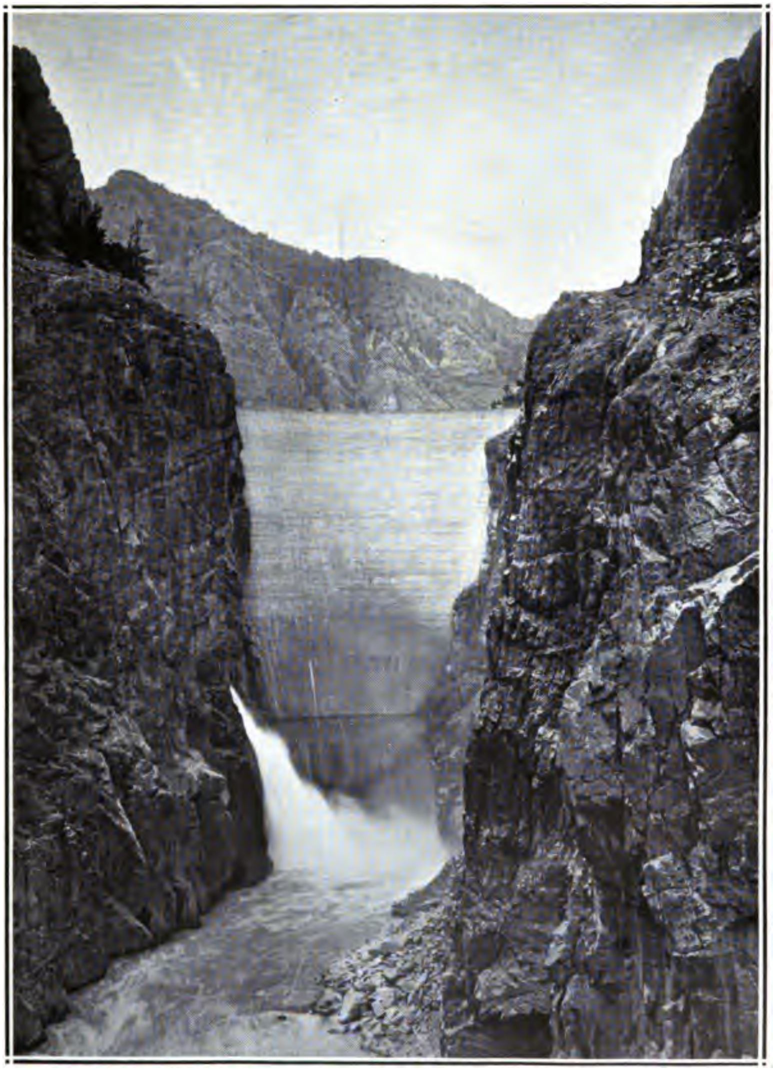
Location and Description. The Shoshone Project is located principally in the northwestern portion of the State of Wyoming, in Park and Big Horn Counties. There is also a small area in Carbon County, Montana.

The irrigation plan of the Shoshone Project provides for the storage of flood water of the Shoshone River in a reservoir controlled by Shoshone Dam, about eight miles above Cody, Wyoming, and three main canals. One canal will take out of the Shoshone Reservoir and the others will divert from the river at various points below the reservoir, the stream bed acting as carrier in the intervening distance. Of these canals, one—the Garland Canal—is constructed, diverting from the river about sixteen miles below the reservoir. Diversion is effected by a low diversion dam, known as the Corbett Dam, into the Corbett Tunnel, and the supply is for the Garland Division, which includes lands near Powell, Wyoming, and the Frannie Division, which covers the area in the vicinity of Deaver. Corbett Tunnel is a horseshoe section, 10 feet 9 inches high by 11 feet 6 inches wide, concrete lined and 3⅓ miles long. The canal and lateral systems have been completed to irrigate 71,000 acres of the 81,600 acres in these two divisions. The principal feature of the Garland Canal below Corbett Tunnel is Ralston Reservoir, ten miles from the head of the tunnel, of 2100 acre feet capacity, which is of great value in regulating the distribution of the water supply.

The Willwood Canal will take out of the river with a concrete diversion dam, and will supply water for 17,000 acres of land lying south of the Shoshone River, opposite the Garland Division.

The third main canal system heading at the Shoshone Dam will be for the Heart Mountain (or High Line) division. The Heart Mountain Division embraces lands on the north side of the Shoshone River in the vicinity of Cody and to the south and east of Heart Mountain, where the area at its eastern limit is contiguous to the Garland Division.

An integral portion of the development of the irrigation system is the construction of a drainage system to relieve lands seeped from the operation of farmers and from the operation of the canal and distribution system, and, also, where possible to protect lands threatened with seepage before that condition becomes so serious as to stop crop production, for once that condition obtains there ensues not only a total crop loss while the land is seeped, but also a period after drainage of only partial production while the water table and alkali salts recede. On the Garland Division of the project, irrigable area 43,400 acres, it is estimated that 7,000 acres have been reclaimed from seepage and that 19,000 acres additional have been protected; but there are now 6,000 acres seriously seeped and 3,500 acres



Shoshone Reservoir Dam—Over 300 Feet High

in need of protection. Drainage work began on the Garland Division in 1911, and has been in progress ever since. Twenty-six miles of open drains and ninety-one miles of closed drains have been constructed. This may be compared with two hundred seventy-seven miles of canal that have been constructed for the service of the above lands. On the Frannie Division, settlement of which began in 1917, when 13,000 acres were opened to entry, there are already 500 acres seriously seeped. Drainage construction was begun in January, 1920. Two miles of open drains have been constructed to date, which it is hoped will furnish relief to 400 acres of land, and protection to 800 acres of land.

Work in Progress 1919-1920. The principal work during this period of time has been drainage construction on the Garland Division and lateral system construction on the Frannie Division. Of the latter construction the work has been the completion of a system to provide water supply to 13,000 acres of land, of which 8,000 acres were opened to entry in the fall of 1919 and the spring of 1920. At the close of the year 1920 work was begun on a hydro-electric power development at Shoshone Dam, of 1600 kilowatt capacity. The principal object of this construction is to furnish power for construction work on the Heart Mountain and Willwood Divisions and for drainage work. Incidentally, the plant will afford commercial power for the towns of the project.

Proposed Work. The principal proposed work during the coming year will be the construction of the power development above referred to and the construction of the Willwood diversion dam and canal system as far as funds will permit. Drainage work will also continue. On the Garland Division there will be employed one trenching machine for the construction of closed drains and four draglines for the construction of open drains. On the Frannie Division there will be employed two draglines for the construction of open drains.

The expenditures on the project for the calendar year 1919 were $594,000, and for the calendar year 1920 it is estimated will be $400,000. The total expenditures to December 31, 1920, it is estimated will be $6,900,000. The expenditures for the calendar year 1921 it is estimated will be $800,000.

Settlement. The years 1919 and 1920 were very active years in the settlement of the project. At the beginning of 1919 there were 55,300 acres of land ready for irrigation, of which 50,100 acres were under water right application. In the fall of 1919 the Seventh Unit of the project, consisting of 4450 acres in the Garland Division and 1120 acres in the Frannie Division, was opened to entry. The building charge was $90 per acre. Of this unit all but 250 acres have now been entered. In the spring of 1920 the Eighth Unit of the project, comprising 4591 acres in the Frannie Division, was opened to entry at $95 per acre, under the Soldier-Land-Settlement Act. All the land in this unit has been entered. At the close of the year there was 65,890 acres of land to which water can be supplied, of which 63,160 acres are covered by water-right application. There are additionally about 5,000 acres of land very nearly ready for water, which it is hoped to open in the near future. The public lands of the area to which the Service can supply water have been divided into 952 farm units. The private land and State land on the same area are estimated to be equivalent to 55 farm units, making the total number of farms on the project over one thousand.

North Platte Cooperative Investigations

The North Platte River is one of the great water supplies of Wyoming. About 20,000 square miles, or one-fifth of the area of the State, is included in the drainage basin of this River. The construction of the great Pathfinder Reservoir was the first step toward regulating and conserving the waters of the North Platte. In the year 1904 the U. S. Reclamation Service obtained a permit from the State of Wyoming to construct this reservoir. As a result the Pathfinder Dam, a notable engineering structure of granite masonry 228 feet in height, blocks a canyon of the North Platte River about fifty miles southwest of the city of Casper and creates a great reservoir covering at high water level more than 22,000 acres to an average depth of over fifty feet. The Pathfinder permit was granted with the supposition that the waters stored would be used largely for the irrigation of lands in Wyoming. We find, however, the condition of today is that more than seventy-five per cent of Pathfinder water is going to Nebraska. Taking the position that Pathfinder might need all the water of the North Platte River, after rights established prior to 1904 had been satisfied, the Federal Government has in practically every way possible restricted and retarded further irrigation development in Wyoming. We, therefore, find that this great natural resource of water supply, and also the great reservoir site to conserve same, has been largely denied this State. To remedy this manifestly unfair condition, a joint cooperative investigation was finally arranged between the State of Wyoming and the United States in 1918.

The final report provided for by the contract was entered by the Board of Review on September 4th of this year. A conservative attitude in the matter of water supply was taken by the Board in order to avoid any findings that might lead to costly development work when the water supply might not warrant same. While the report of the Board seems entirely fair to not only the State of Wyoming and the United States, but also to the interests represented in both Colorado and Nebraska, it should do much to assure to Wyoming the benefits which this State should in all justice derive from the water supply of the North Platte River.

The Board of Review found generally that the North Platte River affords a sufficient water supply for the irrigation of all the arable lands in the valley that are likely to be developed; that further irrigation development in Wyoming need not be restricted; and that further development in Nebraska should depend upon the construction of reservoirs at Guernsey, Wyoming, or at Keystone, Lisco or other possible sites in Nebraska, in order to conserve for Nebraska use waters that are now running to waste through the lower river. The full report of the Board of Review that follows well shows the findings and reasoning that lead to the conclusions and recommendations adopted:

REPORT OF THE BOARD OF REVIEW ON NORTH PLATTE COOPERATIVE INVESTIGATIONS

Denver, Colo., September 4, 1920.

To the Honorable the Secretary of the Interior, and His
Excellency, the Governor of Wyoming.

Sirs: The undersigned Board of Review has the honor to submit herewith its report on North Platte Cooperative Investigations provided for by the contract between the State of Wyoming and the United States, dated January 15, 1918.

Respectfully,
L. G. CARPENTER,
FRANK C. EMERSON,
E. A. MORITZ,
Board of Review.

1. This report is submitted in pursuance of a contract signed by the Secretary of the Interior and the Governor of the State of Wyoming, under date of January 15, 1918.

2. This contract provides for an investigation of the possibility and feasibility of future reclamation of arid lands in the North Platte Valley in Wyoming; surveys and investigations to be made jointly by an Engineer of the Reclamation Service and an Engineer of the State of Wyoming.

3. The contract provides, further, that on the completion of such surveys and investigations the facts and conclusions reported shall be reviewed by an impartial Board, one member of which is to be selected by the State of Wyoming, one by the Reclamation Service, and a third to be chosen by these two. The Board is directed to make specific conclusions and recommendations as to the future policy considered the most advisa-

ble for the United States and the State of Wyoming to follow in utilizing, reserving and disposing of public lands, waters, reservoir and power sites, and other natural utilities.

4. In conformity with the contract, surveys and investigations were made jointly by Harold Conkling, an Engineer of the Reclamation Service, and Ralph I. Meeker, an Engineer representing the State of Wyoming. The report of Messrs. Conkling and Meeker is in two volumes dated January, 1919, entitled "Report on Irrigation Possibilities in the North Platte River Basin." Copies of said report are on file in the office of the State Engineer of Wyoming, and in the offices of the Chief Engineer and Director of the United States Reclamation Service.

5. The Board of Review provided for by the contract was formed by the appointment of Frank C. Emerson, State Engineer, selected by the State of Wyoming; E. A. Moritz, Engineer, appointed by the Reclamation Service; and by the joint selection by the two parties of L. G. Carpenter, Consulting Engineer, of Denver, as the third member.

6. The present report is the result of the consideration and examination of this Board of Review, based on the careful work and extensive report of the Engineers, supplemented by its own independent investigations and knowledge. In the course of its examination, the Board has traversed the entire North Platte Valley from Kearney, Nebraska, about 100 miles below the mouth of the North Platte River, through Nebraska and Wyoming and to the headwaters in North Park, Colorado. This required an automobile trip of more than 1,000 miles and was directed to an examination of the general conditions of the valley as bearing on the questions submitted in the contract, and especially to the conditions relating to irrigation under the diverse conditions of elevation, climate and soil; to the physical limitations controlling diversion and storage of water; to possible reservoir sites, and the principal proposed new developments.

The North Platte Valley

7. The North Platte River has its source in the mountains of Colorado and drains about 1,800 square miles in that State; thence it flows in a general northerly direction to Casper, Wyoming; thence east to Douglas, Wyoming; thence in a southeasterly direction across the Wyoming-Nebraska state line, continuing in the same direction to its confluence with the South Platte River at North Platte to form the Platte River. The drainage area in Wyoming is 20,000 square miles, exclusive of the Laramie River basin, which has not been included in this investigation for the reason that the waters arising therein will

be almost entirely consumed in said basin and therefore will not contribute materially to the ultimate development of the lands tributary to the main stream. The drainage area in Nebraska is about 7,000 square miles.

8. The area drained in Colorado has been designated Section 1; the territory from the Colorado-Wyoming line to Pathfinder Dam has been designated Section 2; from Pathfinder Dam to the Whalen Dam, which is the diversion dam for the North Platte Project, has been designated Section 3; Section 4 is the Laramie River basin, not considered in this report; Section 5 includes the North Platte Project and extends from the Whalen Dam to Bridgeport; Section 6, from Bridgeport to North Platte; and Section 7, from North Platte to Kearney. (See accompanying map.) These are convenient designations for sections having different characteristics as to topography, climate and agricultural possibilities.

9. There is a wide variation in climate and elevation between the upper and lower valleys. The elevation changes from about 8,000 feet in the upper regions to about 2,500 feet in the lower regions. Mean annual precipitation varies from 9 to 24 inches and mean annual temperatures from 38 degrees F. to 50 degrees F. Therefore, as might be inferred, there is a gradual transition in adaptable crops from wild hay and other hardy crops in the upper regions to all kinds of grain, alfalfa, sugar beet and similar crops in the lower regions; and, moreover, in Sections 6 and 7 there is a gradual change from irrigated crops to the unirrigated crops common to the Middle West.

10. There is a great variation in the need for and the use of water in the several sections. The quantity of water consumed in Section 1 is relatively small because of the nature of the crops raised and because a large part of the water used for irrigation is returned to the river. The same is true in a lesser degree of Section 2, the quantity of water consumed in this section being somewhat larger, however, than in Section 1. In Sections 3 and 5 water is always needed to raise crops and considerably larger quantities are required than in the territory above because of the nature of the crops raised and the longer irrigation season. Further down stream, in Sections 6 and 7, the rainfall increases until at the lower end of Section 7 it is sufficient in most years to raise crops without irrigation. For this reason, the average use of water as we proceed downstream from Section 5 decreases quite materially and fluctuates greatly from year to year, such fluctuation varying with the rainfall during the growing season.

11. On account of the wide variation in the agricultural conditions thus described, it is difficult to determine in what

region the available water supply can be utilized most beneficially. But fortunately the water supply appears to be ample for all the lands susceptible of irrigation development and this simplifies the situation in a marked degree.

12. The following table gives the present status of irrigation development as shown in the Conkling-Meeker report:

Section	Estimated area irrigated
1	110,000
2	105,000
3	40,000
5	250,000*
6	55,000
7	38,000

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*Canals now under construction for 170,000 acres additional.

Water Supply

13. It is impossible to solve the problems of Wyoming without considering conditions in the North Platte Valley in the adjoining States of Colorado and Nebraska, and therefore the scope of the investigation has had to include a study of the water supply and its present utilization in the entire North Platte watershed.

14. The analyses of water supply have been made with a view to determining, first, if the water supply is sufficient to provide for all present rights, active and potential; and second. to determine what additional areas might be developed with the available water.

15. The studies indicate that the water supply is sufficient for all existing rights and that there is some surplus available for further development without the construction of additional reservoirs.

16. The investigations have also developed the fact that the construction of reservoirs at Guernsey, Wyoming, Keystone, Nebraska, or Lisco, Nebraska, or such other feasible sites as may be found in the lower valley, will probably permit the development of all the irrigable areas in Nebraska that are susceptible of irrigation.

17. The water supply analyses made by the engineers have been examined in detail and all assumptions and processes have been carefully reviewed. Additional studies were also made by this Board which substantially confirm the results derived by them and lead to the conclusion that the water supply of the North Platte River is ample for all the lands susceptible of irrigation development therefrom. Such conclusion does not

permit definite proof but must rest largely on the broad consideration of the accuracy of the assumptions made and of the history of irrigation development which has demonstrated the manner of growth of irrigation and the decreasing use of water therewith.

Cost Estimates

18. The engineers' report contains estimates of cost of possible projects in Wyoming and estimates of cost of possible reservoirs. While these estimates are deemed of minor importance in the determination of future policies, they are valuable for indicating the relative cost of irrigation works for the several projects considered. It is not to be forgotten that there are many other considerations than cost that govern the desirability of a project.

Conclusions

19. The result of the deliberations of this Board may be summed up in the following conclusions:

(a) The North Platte River affords a sufficient water supply for the irrigation of the arable lands in the valley that are likely to be developed, provided the available reservoir sites are utilized for storage and all the water available is used to good economic advantage.

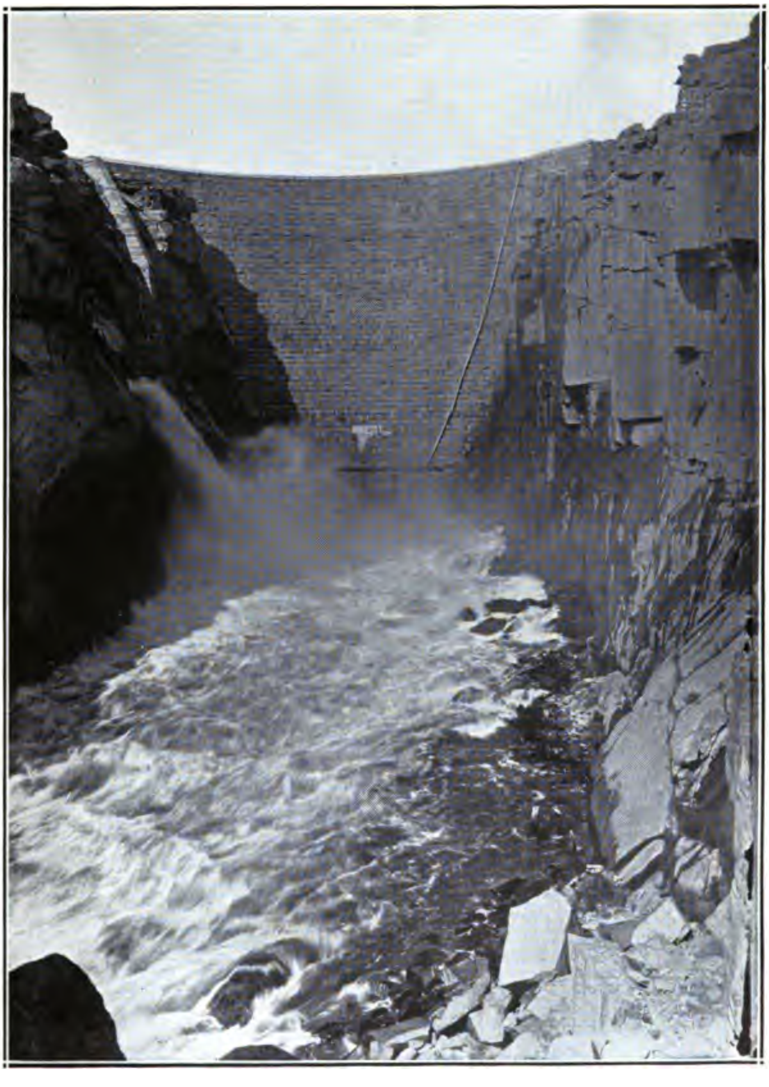
(b) Further irrigation development in Colorado and Wyoming need not be restricted.

(c) Further development, and assured water supply for lands now under irrigation, below the North Platte project depend upon the construction of reservoirs at the Guernsey, Keystone, Lisco, or other feasible sites, which will conserve an adequate portion of the water now going to waste annually on account of lack of storage and regulation.

(d) The area of land in Wyoming, not now irrigated nor having vested rights that is susceptible of reclamation from the North Platte River and its tributaries is limited by physical and economic conditions and seems not to exceed about 300,000 acres. Development will undoubtedly proceed slowly, but the lands should be included in any general consideration of the development of the entire North Platte Valley.

(e) The same is true of about 70,000 acres of land in North Park, Colorado. These areas are in addition to 30,000 acres having vested rights.

(f) There are several good power sites on the North Platte River, the development of which, on a large scale, however, must await the development of suitable markets.



Pathfinder Reservoir Dam—Downstream Face

Discussion of Conclusions

20. Conclusion (a)—

> "The North Platte River affords a sufficient water supply for the irrigation of the arable lands in the valley that are likely to be developed, provided the available reservoir sites are utilized for storage and all the water available is used to good economic advantage."

This conclusion has been reached after a careful study of the water supply analyses given in the Conkling-Meeker report and the assumptions upon which such analyses are based. Many broad assumptions must necessarily be made and they must also lean heavily toward the side of safety. The question of consumptive use, canal losses, return flow, river losses, and the difficulty of closely controlling storage release are all more or less indeterminate. The assumptions made in the report are believed by this Board to be well on the side of safety from the standpoint of water supply.

The diversion assumed for the 260,000 acres included in the North Platte Project is 3 acre feet per acre made up of 1.7 acre feet per acre consumptive use and 1.3 acre feet per acre loss. This loss corresponds in percentage with the results of measurements on the Interstate unit during the past seven years which indicate an average loss from canals and laterals of 44 per cent of the quantity diverted. The maximum quantity of water delivered to the land in any year was 2.92 acre feet per acre in 1914. With a loss of 44 per cent, this gives a diversion of 5.2 acre feet per acre. The minimum quantity delivered to the land in any year was 1.38 acre feet per acre in 1915, which on a similar loss basis corresponds to a diversion of 2.5 acre feet per acre. Actually the diversion in that year was 3.3 acre feet per acre, the losses having been reported as 66 per cent, which is very much greater than has been reported for any other year.

With a diversion duty of 3 acre feet per acre and a canal loss of 44 per cent, the quantity available for consumptive use is 1.68 acre feet per acre, which is 75 per cent as much as the average past use on the Interstate unit, 22 per cent more than the minimum past use and 57 per cent as much as the maximum past use. Such quantity appears to be entirely sufficient, especially in view of the fact that the rainfall during the irrigation season averages 12 inches and has a minimum of 6 inches.

Moreover, general experience in this and other countries shows a decided tendency for a decrease with time in the amount of water required. This comes as a consequence of filling in the subsoil so that the portion thus consumed is lessened or eliminated; to the increased smoothing of the surface of the fields, so that the large amount of waste in distribution due to a rough and uneven surface is lessened; to the increased skill of irrigators and their greater familiarity with the economical ways of distributing water on their own land; and to community knowledge gained from experience that less water is needed for best agricultural purposes than is usually considered necessary by the inexperienced. The time for this effect to become noticeable varies under different conditions.

The effect of this tendency has been shown in various instances. Many canals, after some years, with the same capacity, irrigate much more land than they were originally designed for. Under conditions quite similar to the North Platte Valley, as in the neighboring South Platte Valley in Colorado, and notably in the Valley of the Poudre, a tributary of the South Platte, where experience and records extend over a number of years, it has been found that the actual amount diverted from the stream has materially decreased. Where formerly three to five feet of water were diverted, now the average is only from one and one-fourth to one and one-half feet, and this is found sufficient.

Further examination of the North Platte Valley shows a great amount of seepage or return waters already in evidence. This tends to increase the acreage that can be irrigated from the original supply, though this may not show in a decrease in the quantity diverted by a particular canal. This re-use of waters becomes an important factor and is more noticeable in its effect upon the lower reaches of the stream. Indirectly, it benefits the upper reaches because it diminishes the demand from the lower valley.

The combined effect of these various causes is to materially increase the irrigated area, because of a decrease in the amount of water required by a given tract and because of an increase in the water supply due to the return water and its re-use.

On the basis of all known facts, the water supply studies show that there is ample water for the development of the entire valley, provided adequate provision is made for storage in the lower valley. Additional hydrographic data on the river should be obtained and a thorough examination of all possible dam and reservoir sites made.

The conclusion that the water supply of the North Platte River is sufficient for the development of the entire valley is based on the broad theory that the water supply will ultimately be used to the best economic advantage and for the greatest benefit of all the users thereof; that occasional shortages in the water supply amounting to even 25 per cent or 30 per cent of the normal use are likely to prove beneficial rather than harmful in their ultimate effect and should therefore not cause concern; that the use of water must and will adjust itself to the quantity available and that less and less water will be used as time goes on and additional lands are brought under irrigation, not only because less water will be available but because it will be found that less water is needed to raise crops.

These theories could not be accepted in a case of small area on a small stream but where hundreds of thousands of acres extending along a river for a distance of 800 miles, are to be supplied by such river having an annual run-off of 2,000,000 acre feet the dangers of disastrous shortages are so remote as to be no cause for concern, provided reasonable caution and good engineering judgment have directed the developments.

21. Conclusion (b)—

> "Further irrigation development in Colorado and Wyoming need not be restricted."

The working out of the water supply situation in the entire North Platte Valley will undoubtedly be a matter of slow development. It will probably be controlled not so much by administrative or court action as by mutual agreement and consent. There are certain rights that must be recognized and respected but in a large measure the situation is beclouded by uncertainties and it is the view of this Board that it would be economically wrong to oppose any development that does not clearly jeopardize the paramount rights of other parties. Thus any practicable development in Wyoming and Colorado will not do and it should therefore be permitted to proceed normally.

It is the opinion of this Board that development in the upper valley, that is above the Whalen dam, can proceed independently of development below not already under way. For the latter, storage in lower valley reservoirs is essential as no further supply can be furnished from above without great attendant losses. Such losses should be avoided as much as possible by using the water on lands nearest to its source, and this points to greater practicable development in Wyoming and Colorado. This does not preclude full development in Nebraska because it is possible to conserve the waters of the lower river which are now lost because of lack of storage reservoirs.

Viewed from the standpoint of highest economic development, it appears to be the proper policy to place no obstacle in the way of development of irrigation in Colorado and Wyoming. From a physical and financial standpoint, such development is so limited and will undoubtedly proceed so slowly as to preclude any probability of serious interference with the rights of Government canals and those entitled to storage water from Pathfinder Reservoir.

22. Conclusion (c)—

> "Further development, and an assured water supply for lands now under irrigation, below the North Platte Project, depend upon the construction of reservoirs at Guernsey, Keystone, Lisco or other feasible sites which will conserve an adequate portion of the water now going to waste annually on account of lack of storage and regulation."

If it be agreed that the limited development possible in Colorado and Wyoming should be permitted to proceed, then this conclusion follows obviously. In any case, the quantity of water that can be supplied from above is so small and such a large part of it is lost in transit that only a small development in Nebraska could be supplied from this source.

The annual run-off of water between Pathfinder and North Platte in excess of irrigation needs is about 1,200,000 acre feet, an amount equal to the annual run-off at Pathfinder after supplying irrigation needs above the reservoir. The conservation of this water is of high economic importance. It cannot be used in Colorado or Wyoming, but a large part can be used in Nebraska if adequate storage works are provided.

It requires from three to six days for water released from Pathfinder reservoir to reach the Whalen dam, and seven to fourteen days to traverse the distance from Pathfinder dam to Kearney, Nebraska, such time depending upon the stage of the river. Much waste of water must be expected because of the impossibility of foreseeing conditions along the river. Storms and resulting floods from side streams and varying temperatures causing changes in seepage and evaporation, which is of a great importance in a wide stream, play havoc with the best laid plans. It is therefore obvious that the regulation or control of this water, in order to supply given needs in the lower reaches of the river, is very difficult. The construction of reservoirs in the lower valley would remove these difficulties and would permit storage of the natural flow of tributary streams during the winter months. The policy should be to encourage the lands in Nebraska to develop the lower reservoirs to the fullest extent found to be economically feasible.

23. Conclusion (d)—

> "The area of land in Wyoming not now irrigated nor having vested rights, that is susceptible of reclamation from the North Platte River and its tributaries is limited by physical and economic conditions and seems not to exceed about 300,000 acres. Development will undoubtedly proceed slowly, but the lands

> should be included in any general consideration of the development of the entire North Platte Valley."

The Conkling-Meeker report gives descriptions and estimates of cost for irrigation of about 156,000 acres of land in Wyoming. The estimates of cost as to a large part of the lands appear high in consideration of present land and crop values in those regions. But any conclusion now reached on this point must take into consideration possible modified conditions in the future which might make the irrigation of these lands very desirable. Moreover, the estimates of both area and cost are based, as preliminary estimates must necessarily be, on limited information and consequently it is impossible to arrive at exact conclusions at this time.

Attention is also directed to the fact that there are other areas in Wyoming not described in the Conkling-Meeker report that are susceptible of development, notably lands north and west of Casper, Wyoming, and the so-called Goshen Hole lands above the present Fort Laramie Canal. The inclusion of these areas would bring the total area in Wyoming to be considered for possible irrigation to 250,000 or 300,000 acres.

The oil and stock industries of Wyoming, as well as the latent farming possibilities of the State, bid fair to create a great change in its economic conditions, and it is not unreasonable to assume that the limited areas in the North Platte Valley in Wyoming, capable of reclamation by irrigation, may become very desirable of development.

It is therefore the view of this Board that it should not be the policy to declare these lands, or any portion of them, impracticable of development on account of high cost and thus in effect bar them from the use of the waters of the North Platte River. Development by private initiative and enterprise should not be prevented by withholding grants of water rights or rights of way over public lands. Such development is not likely to proceed faster than the local economic conditions warrant. Gradual development in accordance with such conditions is the healthiest and most permanent form and should therefore be unhampered by any outside restrictions that are not clearly necessary.

24. Conclusion (f)—

> "There are several good power sites on the North Platte River, the development of which, however, on a large scale, must await the development of suitable markets."

There is at the present time some demand for water power for municipal and industrial purposes, but these require a comparatively small quantity of power and do not warrant the construction of the larger power projects on the river. In order to make such large projects practicable, a much larger market must be had, such as railroad electrification would offer. There is a possibility, and perhaps a probability, that such electrification will at some time be found desirable.

Development of power at the Pathfinder dam in the near future appears feasible, especially as some of the projects proposed between Casper and Douglas could be developed by pumping with power developed at that point. In that case it would be practicable to furnish power from this source for industrial and municipal use.

Recommendations

25. In accordance with the foregoing conclusions, this Board respectfully submits the following recommendations as to the future policies considered the most advisable to be followed by the United States and the State of Wyoming in connection with the irrigation development in the North Platte Valley:

(a) That such restrictions as have been placed on irrigation development in Colorado and Wyoming in the past on the supposition that there was an insufficient supply of water be removed. These include the refusal to grant rights of way for ditches and reservoirs on public lands; rejection of desert land entries and failure to act on Carey Act segregations.

(b) That no obstacles be placed in the way of irrigation development in any section of the North Platte Valley.

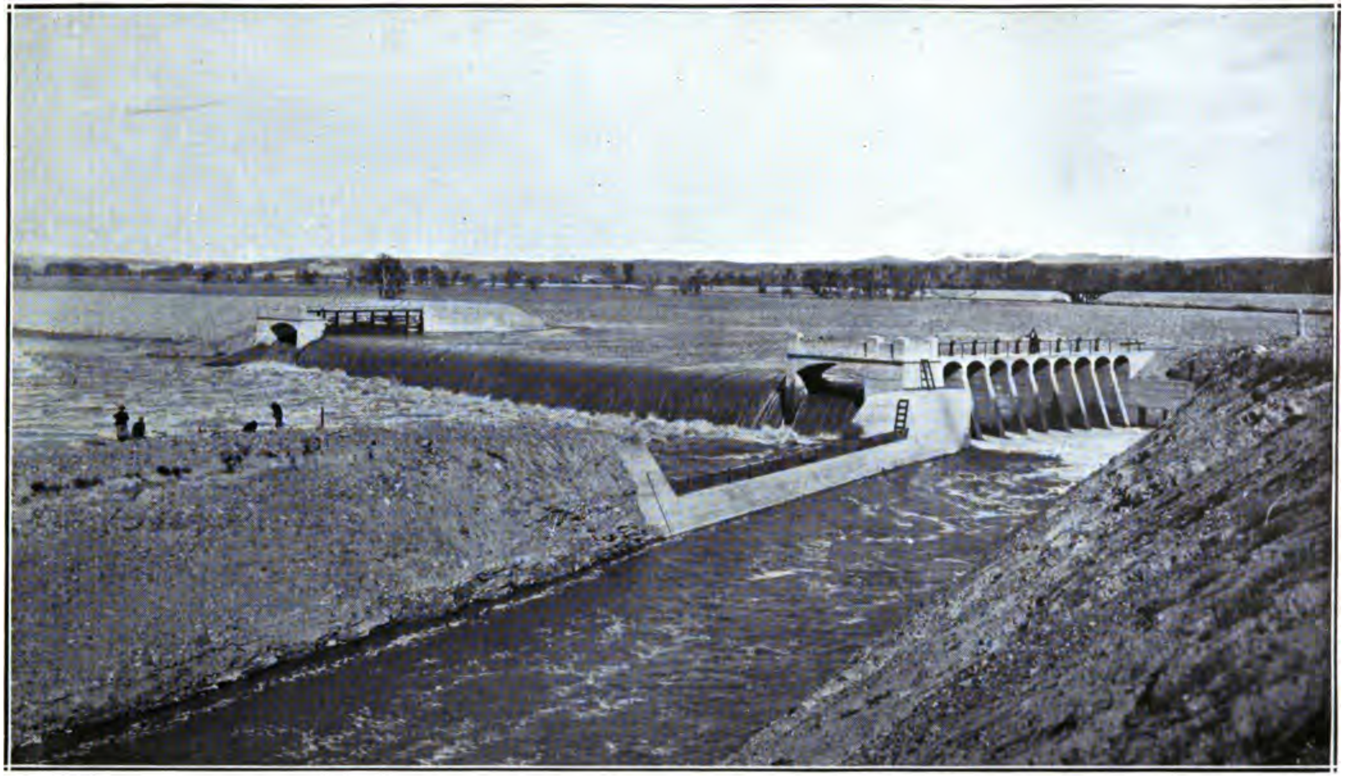
(c) That development by private enterprise be permitted to proceed without artificial restrictions. The natural conditions of the valley provide such limitations that the amount of development is not apt to exceed the water supply.

(d) That no more water be sold from Pathfinder reservoir for diversion below the Whalen dam.

(e) That the proposed dam across the North Platte River near Guernsey, Wyoming, be built by the United States at as early a date as possible, as a means of further conserving the water of the North Platte and as a valuable aid in the regulation, distribution and economical use of those waters. This appears to be the most logical next step in the irrigation development of the North Platte Valley.

(f) That encouragement be given to development in Nebraska by construction of reservoirs in the lower valley, thus conserving the large run-off below Pathfinder that is now unused.

(g) That the Department of the Interior should expedite action on matters referring to Carey Act projects so that settlers and the State will not be discouraged by delay from carrying out the proposed development.



Whalen Diversion Dam and Headworks

Interstate Canal in Foreground. Ft. Laramie Canal Across River

(h) That both the State and the Federal Governments continue to collect data in regard to stream flow, return flow and other gains and losses of the North Platte River and its tributaries.

(i) That the State and Federal Governments assist the various interests along the river, when solicited, in obtaining accurate information relative to dam and reservoir sites and other information needed for a full knowledge of the situation.

(j) That likewise, in regard to the development of power sites the State and Federal Governments give encouragement by furnishing such facts as may be available and removing obstacles that may prevent their development. The willingness of responsible parties to develop such enterprises is to a great extent an indication of their desirability.

(k) The Board feels strongly that it would be very unfortunate and decidedly subversive of the best interests of all concerned, if the numerous questions, admittedly vexatious and difficult of solution, could not be disposed of by amicable negotiation and cooperation. Conferences and cooperative effort should therefore be encouraged. If there can be a free exchange of views and discussion of problems by the various parties in interest, misunderstandings and serious differences will be lessened and ultimately removed.

L. G. CARPENTER,
FRANK C. EMERSON,
E. A. MORITZ,
Board of Review.

TAXATION OF IRRIGATION WORKS

The direct taxation of irrigation works has long been a question of serious consideration to those interested in irrigation development. The investment in ditches, reservoirs and other works in any case is directly reflected in the increased values placed upon the lands benefited thereby. In the irrigated sections of Wyoming practically all the valuation of the farm lands is due to the benefits received from the irrigation works serving them. Notwithstanding these facts, the works constructed by private companies are taxed as such in some instances.

The irrigation works constructed by the U. S. Reclamation Service are exempt from taxation; the ditches, canals, reservoirs and other works constructed by individual ranchmen or associations of farmers are uniformly exempted; but we find that some counties in the State are taxing irrigation works, as such, constructed by private companies. This situation does not seem fair to the interests that invest their money in our irrigation projects. Their troubles are enough without adding what in many cases is a system of double taxation, as first against the irrigation works themselves and then against the land values created by these works. Whatever increased burden may be placed by tax upon the irrigation works must be eventually borne by the lands irrigated thereunder.

The development of irrigation projects by private interests is important to Wyoming, and the State receives great benefits from such enterprise. It would therefore seem that the exemption of irrigation works from taxation generally would be an equitable provision of law, and at the same time assure to private enterprise that the further burden of direct taxation would not have to be charged against their constructed works. A recommendation to this effect is contained under the heading of "Needed Legislation".

CONSOLIDATION OF DITCHES

In many sections of the State a consolidation of smaller ditches into larger carriers would be a material benefit to the irrigation interests involved. By such means, in many cases, a much more economical use of water could be obtained, costs of operation and maintenance materially reduced, land now occupied by existing ditches made available for the raising of crops, and other material improvements in the situation obtained.

Some streams of the State lose heavily at certain points in their courses by the loss of water through seepage into the gravel or from other causes. In several situations of this kind a canal consolidating several ditches diverting water below such points of loss, but itself diverting water above and carrying same around such point, would effect a decided saving in water of the stream. Progress towards remedying conditions by the means here suggested has been made in the Star Valley in the western part of the State. Work along the same line could very profitably be undertaken in many other sections. The Superintendent of Water Division No. 3 calls attention particularly to the advantages of such development in the Popo Agie and Greybull Valleys of his District.

The transfer of rights from one ditch to another, where such transfer will not injure the rights of other appropriators, can be accomplished by proper petition to the State Engineer or Board of Control according as to whether the rights involved are under permit only, or have been adjudicated. This office will be glad to render every assistance possible to promote such plans. This matter is commended to the careful consideration of the water users in such districts as might be benefited by changes as suggested in means of conveyance of water.

ATTACHING RESERVOIR WATER

The Wyoming law provides that "Water rights cannot be detached from the lands, place or purpose for which they are acquired, without loss of priority". This is one of the fundamentals of our code, and at least as far as direct flow rights are concerned the attaching of water to land is the most desirable provision. The comparative small amount of litigation over water rights in Wyoming today is to no small extent attributable to this policy. If a policy had been adopted whereby water rights could be sold indiscriminately, or divorced from the conditions under which they were obtained, it would make a speculative commodity of the water of the State. The equilibrium of conditions on our streams would be continually changed and the regulation and distribution of water made a difficult procedure. Rights acquired under certain conditions might be found worthless by changes afterwards allowed other rights. Instead of the exceptional stable form of agriculture now provided by irrigation, a failure to attach water to land would introduce many elements of doubt that would greatly militate against our farming interests.

The preceding is entirely true of direct flow rights. When the question of reservoirs is considered somewhat different conditions obtain. By the construction of a reservoir a certain definite amount of stored water is provided. In most cases this storage supplements the water furnished to direct flow rights. The amount of supplemental supply required is dependent upon the water supply of each stream and the priority of the direct flow rights involved. Changing conditions on a stream will further vary the amount of water needed for supplemental supply. By the construction of a reservoir a certain tangible thing, expressed in units of acre feet of capacity, is acquired. To provide a certain mobility in the rights to use the definite amounts of stored water provided by virtue of the construction of a reservoir, provision of law for approved transfers might well be made.

It is required by our law at present that the application for a secondary permit, which would constitute the ditch permit enumerating the lands to which stored water was to be applied, need not be filed at the same time as application is made for the primary permit for the reservoir itself. Before the owners of storage in a reservoir would be legally entitled to use water therefrom, however, the secondary attaching the stored water to certain lands would need to be filed. So long as the right remains one under permit, it is possible that a legal transfer of stored water from one tract of land to another could be accomplished by request for cancellation of one permit and an application for another permit to cover the new lands. In light of the quotation of law referred to in the preceding, however, there is some doubt in this matter. In the case of an adjudicated right, it is manifest that there is no present provision for a transfer.

The power to make a legal transfer of stored water, in whole or in part, from one tract of land to another, is believed by this office to be desirable. Such transfers as would not seriously threaten the situation on a stream or detrimentally affect other rights could be allowed. It is the opinion of this office, however, that such transfers should only be made upon a public notice, and with the approval of the officers charged with the administration of the waters of the State. Under such a properly guarded procedure the possibility of making such transfers of reservoir water can well be considered. A recommendation to this effect will be found under the subject of "Needed Legislation".

RECIPROCITY BETWEEN STATES

For the most part streams rise in Wyoming to flow across our boundary lines into other states. This condition is almost entirely true when we consider our situation with respect to the states of Idaho, Montana, South Dakota and Nebraska. Our most important water supplies, with one exception, flow from Wyoming into these states. Our situation with respect to the states of Utah and Colorado, however, is somewhat different.

The Bear River in the southwestern part of our State crosses and recrosses the boundary line between Wyoming and Utah several times. The same situation applies to a less extent to Black's Fork River and other smaller streams. The questions of acquiring water rights and of the proper administration of same on these streams therefore become of considerable importance. In lack of any agreement between the two states there is but little cooperation practiced, although the different streams irrigate important areas of farm lands in both states. It would, therefore, seem desirable that reciprocal agreements be entered into between the states, whereby the interests of both could be equally guarded and protected. Cooperation is essential to the proper administration of water rights involved. This question has been discussed by this office with the State Engineer's office of Utah. Both recognize the need of reciprocal agreements and commend same to the consideration of the legislatures of the two states.

Unless recently repealed, the State of Colorado has a law upon its statutes whereby it is declared unlawful to divert, carry or transport the waters of any water course of Colorado into any other State for use therein. Until such law should be repealed, Colorado would not be in position to enter a reciprocal agreement with Wyoming, although it is believed that the same would be to the mutual interests of both states.

DRAINAGE

The work of underdrainage in connection with many of the irrigated areas in Wyoming has developed to considerable proportions during the past few years. The excessive use of water in irrigation, or certain subsoil conditions, have caused an excess of moisture to be retained in the ground. The result is a seeped or bogged condition of the land and the bringing of injurious alkalies to the surface. The final result is the impossibility of growing crops on such land.

While in many cases seepage can be prevented, or at least greatly retarded, by a conservative use of water, there are many places where the subsoil conditions are such as to cause seepage eventually, even though a most careful use of water in irrigation may be practiced. The reclamation of seeped lands can be uniformly accomplished by some system of drainage works.

Drainage has been carried on to a wide extent in the Big Horn Basin. This work has had to follow the irrigation of lands under nearly all the large irrigation projects in this section. Land owners were at first very skeptical of the success of underdrainage, and it was very difficult to organize the first few districts. Today the relief afforded by drainage is well recognized and there is but little trouble in promoting a district as soon as a seeped condition to any material extent is evidenced. The Drainage District Law has operated very satisfactorily as a whole, and the district bonds have found a ready sale at only a small discount.

The system of drainage most favored in this State is the closed tile drain. This system is more expensive than the open ditch, but the fact that the thorough backfilling of the ditch prevents any farm lands from being lost to production, and a lower maintenance cost obtained, in most cases fully repays the additional expense. The subsoil conditions largely gage the depths at which drains must be located to give the most effective service. Most drains now run in depths of from seven to ten feet. Trenching machines have nearly entirely replaced hand labor in constructing drain ditches.

The open drain is employed where construction difficulties make the closed drain too expensive, or otherwise impracticable. The open ditches are usually constructed by dragline excavators and a low cost obtained thereby. It is often practical to lay tile in a dragline ditch and by later backfilling convert the open into a closed drain.

The success of drainage work is now well established. Whenever lands show a material amount of seepage steps should at once be taken to provide underdrainage for same. The sooner the work is undertaken the lower will be the cost of construction and the sooner will the land be returned to production. Seepage can in most cases be anticipated and drainage works not only installed at a comparatively small cost before conditions become bad, but the land affected can be kept under a continuous state of production. Land owners are, therefore, urged to keep close account of the conditions of their lands in relation to the matter of proper drainage.

To Market

Consumers

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ENGINEER'S LICENSE LAW

As a whole, the License Law, as passed by the 1919 legislature, seems to be operating well and has the general support of engineers and surveyors. Some amendments to the law, however, would be very desirable. However, the Board of Examining Engineers does not believe it advisable to undertake the correction of defects in the law at this time. The present law is the third that has been passed by the legislature and repeated amendments or new enactments hereafter will probably not be looked upon with much favor. Agitation is current throughout the country as to license laws, and different organizations are now attempting to promote a uniform license law that will apply in fundamentals to all states. In view of the situation as it now exists, it would seem advisable to wait at least another two years before attempting the amendment or reenactment of our Wyoming law. When another attempt is made, we should be assured that the law proposed will best fit our needs and conditions.

The two classifications of surveyor and engineer appear to well fit conditions in this State. The records in the State Engineer's office have shown the advantage of a law licensing men performing the work covered by the class of surveyor. Maps and data now submitted to the office can uniformly be depended upon as accurate. This was not true when anyone could deface a piece of tracing cloth and send it in to the office as a proper map for filing with an application to appropriate water.

Some misunderstanding seems to exist in regard to the written examination as required by the License Law. There seems to be an impression among some that this examination is very technical in character, and can only be passed by an applicant when his head is crammed with formulae and theory. This is not the character, however, of the examination. The Board wishes also to correct the impression among some that the examination particularly applies to irrigation matters. Other branches of the profession covered by the law are given equal weight. The questions propounded are such that at least the majority of them should be answered more or less readily by any man qualified to practice in the grade for which he applies for license. The qualification record of an applicant is given as much weight by the Board as the written examination. The entire aim of the Board is to determine whether or not the applicant is qualified to go out in actual practice and give competent service to his employers. The present Board is no respecter of persons, and everyone applying for a license is required to take the written examination.

The Board of Examining Engineers now consists of J. A. Elliott, Wheatland, President; Clyde W. Atherly, Basin, Treasurer; and Frank C. Emerson, Cheyenne, Secretary. A list of the licensed engineers and surveyors of the State follows:

ENGINEERS

Name	Address
Anderson, Edward S.	Pocatello, Idaho
Andrews, Thaddeus H.	Lusk, Wyoming
Atherly, Clyde W.	Basin, Wyoming
Avery, C. Dwight	Washington, D. C.
Ayers, Augustine H.	Riverton, Wyoming
Baldwin, T. H.	Cheyenne, Wyoming
Bartlett, Albert B.	Glendo, Wyoming
Beach, C. S.	Frontier, Wyoming
Beebe, John C.	Clearmont, Wyoming
Bell, Howard F.	Cody, Wyoming
Bellamy, Ben C.	Laramie, Wyoming
Bickel, Paul S. A.	Boise, Idaho
Bishop, L. C.	Douglas, Wyoming
Bishop, Lyman E.	Denver, Colorado
Bowman, James S.	Clearmont, Wyoming
Brown, N. H.	Lander, Wyoming
Burritt, Edwin W.	Buffalo, Wyoming
Carlisle, C. C.	Cheyenne, Wyoming
Chapman, G. Hobart	Evanston, Wyoming
Chessington, J. B.	Thermopolis, Wyoming
Cleary, John B.	Casper, Wyoming
Comstock, H. D.	Riverton, Wyoming
Conrad, L. E.	Manhattan, Kansas
Coy, Burgis G.	Ft. Collins, Colorado
Cummings, F. T.	Douglas, Wyoming
Davis, Ralph E.	Omaha, Nebraska
Eder, Ernest O.	Buffalo, Wyoming
Elliott, J. A.	Wheatland, Wyoming
Emerson, Frank C.	Cheyenne, Wyoming

Fellows, A. Lincoln	Denver, Colorado
Fitterer, J. C.	Laramie, Wyoming
Foreman, Chester A.	Cheyenne, Wyoming
Gatchell, Frank	Buffalo, Wyoming
Gillette, Edward	Sheridan, Wyoming
Gonin, John	Wind River, Wyoming
Gray, R. F.	Lusk, Wyoming
Gwillim, E. C.	Sheridan, Wyoming
Hayden, C. E.	Manderson, Wyoming
Hays, James B.	Boise, Idaho
Hemingway, Ambrose	Casper, Wyoming
Hosig, I. B.	Powell, Wyoming
Hudman, Ellis	Rock Springs, Wyoming
Huntington, H. M.	Cheyenne, Wyoming
Kimball, Farley	Wind River, Wyoming
Kimball, Russell	Cody, Wyoming
Kingdon, Justin T.	Cheyenne, Wyoming
Knittle, Frank S.	Casper, Wyoming
Kuntz, G. T.	Evanston, Wyoming
Leary, James W.	Green River, Wyoming
Lloyd, Henry	Cheyenne, Wyoming
Lloyd, John E.	Marbleton, Wyoming
Luten, Daniel B.	Indianapolis, Indiana
Mahoney, J. F.	Rawlins, Wyoming
Marzel, J. G.	Torrington, Wyoming
Moenke, W. F.	Sunrise, Wyoming
Morrill, B. F.	Thermopolis, Wyoming
McCoy, Robert Z.	Rock River, Wyoming
Nelson, Elmer K.	Cheyenne, Wyoming
Newcomb, R. V.	Big Piney, Wyoming
Nilson, Nils	Sundance, Wyoming
Nixon, H. S.	Omaha, Nebraska
Pederson, J. D.	Jackson, Wyoming
Robinson, H. E.	Kemmerer, Wyoming
Salisbury, Royal D.	Denver, Colorado
Sanford, F. N.	Casper, Wyoming
Schenk, G. J.	Basin, Wyoming
Sevison, Z. E.	Cheyenne, Wyoming
Shawver, C. D.	Cheyenne, Wyoming
Sloan, W. G.	Boise, Idaho
Swendsen, Myron	Boise, Idaho
Templeton, R. M.	Thermopolis, Wyoming
Tillett, Wm. B.	Kane, Wyoming
True, Jas. B.	Cheyenne, Wyoming
Warren, Fred E.	Cheyenne, Wyoming
Watson, H. G.	Cheyenne, Wyoming
Webber, Ward P.	Lander, Wyoming

Welles, Charles B.	Colorado Springs, Colorado
Wheeler, M. N.	Casper, Wyoming
Whiting, J. A.	Cheyenne, Wyoming
Wilkinson, E. B.	Newcastle, Wyoming
Williams, F. C.	Sheridan, Wyoming
Willson, Eugene P.	Lusk, Wyoming
Wilson, Clifford S.	Driggs, Idaho
Wilson, T. Ross	Driggs, Idaho
Wisda, James W.	Rawlins, Wyoming
Woodward, I. D.	Riverton, Wyoming
Zorn, G. W.	Greybull, Wyoming

SURVEYORS

Allen, W. P.	Buffalo, Wyoming
Bailey, A. W.	Gillette, Wyoming
Becker, J. A.	Newcastle, Wyoming
Bond, Warwick E.	Newcastle, Wyoming
Clark, Robert E.	Newcastle, Wyoming
Coates, R. N.	Frontier, Wyoming
Cole, J. A.	Wheatland, Wyoming
Corcoran, Charles G.	Rawlins, Wyoming
Cotner, Victor	Lovell, Wyoming
Crabb, Edward L.	Shoshoni, Wyoming
Crone, Cloyd A.	Walcott, Wyoming
Feltner, Curtis C.	Pinedale, Wyoming
Fillerup, A. F.	Lovell, Wyoming
Fox, W. R.	Gillette, Wyoming
Gradert, Emil C.	Robertson, Wyoming
Hall, R. H.	Hudson, Wyoming
Harvey, J. C.	Gillette, Wyoming
Haste, Glenn R.	Newcastle, Wyoming
Higby, Guy W.	Lander, Wyoming
Horton, Wm. L.	Big Trails, Wyoming
Howard, F. C.	Douglas, Wyoming
Howell, Bernard A.	Newcastle, Wyoming
Howland, W. B.	Parkerton, Wyoming
Hull, John M.	Lusk, Wyoming
Ingham, Arthur W.	Clearmont, Wyoming
Ingram, John E.	Afton, Wyoming
Jenkins, P. W.	Cora, Wyoming
Johnson, T. W.	Buffalo, Wyoming
Kennedy, Robert E.	Worland, Wyoming
Knittle, Thos. R.	Douglas, Wyoming
McDonald, W. H.	Big Piney, Wyoming
McKinstry, H. C.	Moran, Wyoming
Neville, Joseph F.	Evanston, Wyoming
Park, Albert	Alcova, Wyoming

Parker, Arthur	Cheyenne, Wyoming
Peck, Roy C.	Saratoga, Wyoming
Rader, C. M.	Manville, Wyoming
Rhodes, Fred W.	Worland, Wyoming
Saxon, Homer	Riverton, Wyoming
Sharp, Seymour S.	Cheyenne, Wyoming
Spielman, Jesse E.	Gillette, Wyoming
Sterrett, C. B.	Saratoga, Wyoming
Ward, M. C.	Walden, Colorado
Williams, Otho E.	Jackson, Wyoming
Wilson, Platt	Kemmerer, Wyoming
Woolery, M. D.	Laramie, Wyoming
Young, H. C.	Glenrock, Wyoming
Zipfel, W. E.	Laramie, Wyoming

NEEDED LEGISLATION

Wyoming has one of the best, if not the best, irrigation law and practice in force today. The truth of this statement is attested by the fact that the fundamentals of the Wyoming law have been widely copied. Realizing the success of our irrigation code in practice, our neighbor on the north, Montana, is now proposing to enact into law a code practically verbatim in all salient features of that of Wyoming. Further favorable evidence is furnished by the fact that litigation in this State in connection with water rights is very limited as compared with other states where irrigation is practiced.

Notwithstanding the good character of our law as a whole, there are certain amendments and additions that can profitably be made. It is not the intention to pick out all the minor points that might profit by amendment or to suggest any additions that do not appeal as being of primary importance. There are, however, certain amendments and additions that this office believes should be enacted into law by reason of their important bearing upon the welfare and prosperity of Wyoming as affected by its irrigation interests.

In connection with the recommendations made below, a careful study has been made of certain laws now in effect in other states, as well as of conditions that apply in Wyoming in relation to the subjects considered. It has not been attempted to present at this time, however, a definite form of statute for each case, as it is the desire to prepare a final form only after consulting different parties interested in the subjects involved. This can best be done when the assembling of the legislature brings to the Capitol the ideas of different interests throughout the State.

The general recommendations of this office in regard to important needed legislation are presented herewith.

State Aid

In accordance with the ideas expressed in the general treatment of this subject heretofore in this report, it is recommended that aid by the State be given to the development of new projects, or of improvement districts, by either or both of the two following plans:

First. By providing for a State Reclamation Service to undertake the development of irrigation projects of medium size, under the same plan as is now in force by the United States Reclamation Service in developing large projects.

Second. By providing for certification by the State of the bonds of irrigation districts upon the examination and approval of same by a Board composed of the Attorney General, State Examiner and State Engineer, with provision that the State participate to a limited extent in financing a district by taking part of the bonds, or paying interest on same for a limited period. Such action by the State should make the bonds of an approved district marketable with the investing public. The greatest obstacle to further irrigation development in a large way, that of financing, would be largely overcome by such a plan.

Taxation of Irrigation Works

In accordance with the reasoning presented heretofore in the general treatment of this question, it is recommended that there be enacted a law exempting from direct taxation canals, reservoirs and other irrigation works constructed for the irrigation of lands within the State of Wyoming.

Attaching Reservoir Water

It is recommended that provision be made for the transfer of the right to use the water stored in any reservoir from one tract of land to another under a properly guarded procedure. (See article on this subject heretofore in this report.)

Reciprocity Between States

It is recommended that a reciprocal agreement be entered into with the State of Utah in order to provide for the proper use, disposal and administration of the waters of the streams that are of joint concern to the two states, and thereby promote the mutual interests of both commonwealths. (See article on this subject heretofore in this report.)

Compensation of Officers

In order to assure competent officials and a proper administration of the irrigation laws of the State, it is recommended that salary increases be granted officers connected with this Department in line with recommendations contained in the current budget. The present abnormal stress in the financial situation should not be allowed to obscure the necessity of providing reasonable compensation, consistent with the importance of the duties the officers of this Department are called upon to perform. Neither the inflated conditions of the past two years, nor the depressed condition of today, should materially influence decisions in these matters, but, rather, effort should be made to provide salaries that will allow competent men to accept and remain in State offices under normal conditions. Adequate salaries will do much to insure efficiency.

It is also recommended that, in addition to per diem allowed Assistant Water Commissioners, their actual and necessary traveling expenses be allowed when employed upon their duties.

Rotation of Use of Water

It is recommended that Section 927, Chapter 69, Wyoming Compiled Statutes, 1920, be amended so as to provide that rotation of water may be practiced only with the consent of the administrative officers of the State, and further that such administrative officers can effect a rotation of water among users when same is deemed necessary for the proper administration and use of the water of the State. Such amended provisions concerning the rotation of use of water would be safeguards to the proper protection of appropriators.

Time for Completing Water Works

It is recommended that Section 840, Chapter 65, Wyoming Compiled Statutes, 1920, be reenacted with considerable amendment. Specific changes are recommended as follows:

First. That the time for submitting final proof on permits which have heretofore expired be extended an additional two years from that specified by the present statute, and that provision be made for the extension of this time by the State Engineer upon the showing of good cause therefor. These amendments seem essential as this office finds that for sufficient cause appropriators in many cases have not been able to submit final proof, nor will they be able to do so prior to February 14, 1921.

Second. That final proof must be submitted within five years after the expiration of time for beneficial use of water. Under the present statute, this time expires in two years after the time specified for beneficial use in the permit. A longer time is considered advisable as, with the Division Superintendent making a trip over his entire territory but once a year, and to certain parts but once in two years, in many cases a needless hardship would be worked upon water users by the shorter limitation.

Third. That the following provisions be stricken from the law: "Default by the holder of a permit in any of such requirements shall work a forfeiture in priority of a water right under permit * * *. In the event of such forfeiture of priority under the permit, however, the appropriator may acquire a priority by actual appopriation from the date of diversion and application of the water to beneficial use." The acquirement of a water right under the Wyoming law is a liberal procedure and works no hardship upon any parties seeking to acquire a completed water right in good faith. Such provisions of law as quoted above can only lead to confusion in the administration of the water rights of the State.

POWER POSSIBILITIES IN WYOMING

By Henry G. Watson, Deputy State Engineer

It has been estimated by the United States Geological Survey that there is potential water power in Wyoming of 1,300,000 horse power. To date, however, but little interest has been shown in water power development, and the possibilities of the State in connection with this great resource have hardly been touched. The great increase in the cost of coal in recent years, and the passage of the Federal Water Power Bill have caused an awakening of interest in this subject. Before the passage of the federal bill it was impossible to really do anything in Wyoming except to investigate water power possibilities in anticipation of legislation that would allow development.

For a number of years the State of Wyoming has been cooperating with the U. S. Geological Survey in conducting measurements of the flow of streams in this State. The great majority of these measurements have been made in relation to irrigation development. However, some measurements have been made in mountainous regions in connection with proposed storage of water. It also happens that most of the topographical work of the U. S. Geological Survey has been in the rougher and more mountainous parts of the State. Profiles of some streams have been made over limited sections which furnish additional data in regard to the fall of streams. In a few instances railroad and highway elevations at stream crossings furnish some data.

Most of the important power possibilities are to be found in the mountainous districts. Any number of small projects appear to be feasible in the lower districts where the larger streams make possible the development of power by the use of considerable volumes of water under low heads.

Markets for any great amount of power do not at present seem available. The electrification of the railroads passing through the State seems to offer the most logical market on a large scale. The Seminole, Pathfinder, and other large possibilities, within easy reach of the railroads of the State, could hardly be improved upon for the economical development of large amounts of power. With the advances that have recently been made in electric smelting of ores, it is quite probable that a market for a large amount of electric power may soon be created from that source. Certain electro-chemical processes also may provide a market for power, as Wyoming's natural resources provide a great abundance of raw materials. Possibilities for small hydro-power projects are numerous throughout the State in connection with municipal supplies and industrial enterprises.

The Big Horn River and its more important tributaries carry large volumes of water throughout the year. Having heavy grades over most sections, these streams afford numerous opportunities for power development. The Boysen Dam constitutes the largest present installation on this watershed, although at the present time but a limited use of the available power is had. The principal present uses are for municipal purposes for the towns of Shoshoni and Riverton. The towns of Lander, Thermopolis and Cody are also served by hydro-electric plants. The U. S. Reclamation Service is now starting construction to develop about 8,000 horse power at the Shoshone Dam, both for construction purposes on their great irrigation project in this section and for municipal and industrial uses. Other developments along these lines are being considered throughout this drainage system, with other promising possibilities for larger developments along the lines suggested heretofore.

The North Platte River drains another watershed in Wyoming. The proposed Seminole Reservoir affords probably the largest and best possibility within the State for hydro-power development on a large scale. Second only to the Seminole is a possible project at the Pathfinder Reservoir. An installation at Pathfinder is feasible for a rather extensive use in pumping water for the irrigation of many thousand acres of land in addition to furnishing power for municipal and industrial purposes throughout a considerable length of the North Platte Valley. By dropping water from its Fort Laramie Canal near Lingle, Wyoming, the U. S. Reclamation Service is developing about 1,500 horse power in connection with construction work on the North Platte Project and for municipal use of the towns of Lingle and Torrington. It is proposed to largely extend the present use. As is true of the Big Horn system, many other promising possibilities apply to the North Platte, including its main Wyoming tributary, the Laramie River.

Many small water power projects have been constructed for muncipal, milling and other industrial uses upon streams in the northeastern part of the State. No large streams are found in this section and developments can only be expected along the line of smaller projects. The uses that are now practiced, however, can be greatly extended.

Outside of a small project on the Gros Ventre River at Kelly, Wyoming, for milling purposes, there have been no developments of water power upon the Snake River system in Jackson's Hole. A small plant serves the town of Afton upon the Salt River. Other small projects are available in these sections. The same is true of the Little Snake River and tributaries in southern Carbon County.

During the past season Mr. Ralf R. Woolley, Hydraulic Engineer, U. S. Geological Survey, conducted a general survey of power possibilities in the Upper Green River Basin. His general findings are set forth by Mr. Wooley in the article that follows.

The records of this office show that projects covering 157,000 horse power have been filed on in Wyoming, of which only between 7,000 and 8,000 horse power have been developed. The investigations of the U. S. Geological Survey, through Mr. Robert Follansbee, District Engineer, and Mr. Woolley, show that from 100,000 to 150,000 additional horse power is available in known localities. Tabulations showing this data follow.

It is anticipated that there will be a decided quickening of interest in relation to water power development within the near future. The promised development of the many resources of the State will afford a substantial aid toward this end.

PROJECTS OF RECORD IN STATE ENGINEER'S OFFICE

STREAM	Discharge cu. ft. per sec.	Available Head	Horse Power	REMARKS
Sand Creek	60	221	1160	
Sand Creek	165	*	*	Beulah flour mill—Constructed
Powder River	35	25	75	Constructed
Piney Creek	188	20	363	Kearney mill—Constructed
Tongue River	54	7	35	Higgins mill—Constructed
Tongue River	450	20	900	Wagner
Tongue River	100	6	50	

PROJECTS OF RECORD IN STATE ENGINEER'S OFFICE—Continued

STREAM	Discharge cu. ft. per sec.	Available Head	Horse Power	REMARKS
Tongue River	30	15	45	Dayton mill—Constructed
Tongue River	100	2030	21300	
Big Goose Creek	15	250	375	
Big Goose Creek	64	2100	12500	
Big Goose Creek	37.5	*	*	Beckton mill—Constructed
Big Goose Creek	132	*	*	Sheridan mill—Constructed
Little Horn River	15	270	315	
Big Horn River	500	9	400	Basin
Big Horn River	740	10	700	Worland
Big Horn River	423	13	500	Thermopolis—Constructed
Big Horn River	2543	16.5	4770	Thermopolis—Proposed
Big Horn River	1000	35	3500	Boysen—Constructed
Shoshone River	500	*	*	Cody—No plans filed
Greybull River	20	550	1000	
Tensleep Creek	18	30	48	
Wind River	335	16	645	Riverton
Wind River	70	9	65	Near Riverton
Wind River	177	12	200	Riverton
North Fk. Popo Agie R.	100	132	1200	
Middle Fk. Popo Agie R.	30	1640	3000	
Middle Fk. Popo Agie R.	40	1200	4500	Cover same section of stream
Middle Fk. Popo Agie R.	50	792	3900	Water supply for only one
Middle Fk. Popo Agie R.	20	200	350	Lander—Constructed
Middle Fk. Popo Agie R.	20	*	*	
Middle Fk. Popo Agie R.	40	288	1100	
Little Popo Agie River	100	750	7000	
Little Popo Agie River	38	672	2900	
Clark's Fork River	250	190	5400	
Clark's Fork River and Crandall Creek	141	275	3100	
Clark's Fork River	175	200	2800	
Dead Indian Creek	20	1000	2272	
Sunlight Creek	100	1190	12300	
Sulphur Creek	12	100	100	
Lagoon Lake	30	8	27	
Gros Ventre River	10	8	60	
Berry Creek	125	88	700	
Teton Creek	20	140	250	
John Day's River	450	90	3500	
Birch Creek	20	28	65	Under Construction
North Spring Creek	23.5	*	*	Constructed
Swift Creek	40	50	200	Afton—Constructed
Salt River	16	*	*	Smoot Mill—Constructed
Luke Creek (28-117)	46	95	450	
Price Creek (25-118)	25.8	100	200	
Bridger Butte Creek (15-115)	11	*	*	Lyman Mill—Destroyed by fire
Scott Lake (14-86)	4	50	20	
Middle Piney Creek (30-114)	*	24.5	*	Saw Mill—Constructed
North Platte River	150	110	1500	Fort Laramie Canal—Constructed by U. S. R. S.
North Platte River	1400	365	50000	Seminole Canyon
Sweetwater River	300	23	780	
Spring Creek (15-85)	15	386	400	
Cow Creek (15-84)	16	44	80	
North Fork Grand Encampment River	*	*	*	Encampment—Constructed—Abandoned
North Fork Grand Encampment River	20	47	100	
Laramie River	145	90	1350	Jelm
Libby Creek (15-78)	45	570	2550	
Nash Ck. and Libby Ck.	46	483	2150	
Clear Creek	40	*	*	Buffalo Mill—Constructed
Clear Creek	20	385	600	Buffalo—Constructed

*Data not on record.

ADDITIONAL INVESTIGATED POSSIBILITIES DERIVED FROM UNITED STATES GEOLOGICAL SURVEY DATA

STREAM	Discharge cu. ft. per sec.	Available Head	Horse Power	REMARKS
Green River (38-110)			3125	Kendall—150-ft. dam
Green River (36-110)		120	5340	Kendall
New Fork River (36-110)		110	450	New Fork Lake
Willow Creek		110	420	Willow Lake
Pine Creek	110	310	3100	Fremont Lake
Pole Creek		280	1780	Half Moon and Fayette Lakes
Fall Creek		225	860	Burnt Lake
Boulder Creek		200	1750	Boulder Lake
Big Horn River		400	18900	
North Fk. Little Wind R.		2500	5900	10,000 Ac. Ft. storage fall in 9 mile section
South Fk. Little Wind R.			2400	
Tensleep Creek		3070	19800	Fall in 12 mile section 28,000 Ac. Ft. storage
Paintrock Creek		3100	11400	Fall in 12 mile section 13,000 Ac. Ft. storage
Shell Creek		3530	9100	Fall in 16 mile section
Shoshone		2540	21000	Fall in 42 mile section
North Fork Shoshone R.		640	14000	Fall in 10 mile section
Tongue River		575	3000	
Tongue River		2700	10700	Similar project already filed on
North Platte	480	200	7600	North Park site
Douglas Creek		540	1280	Fall in 4 mile section
French Creek		500	900	Fall in 4 mile section
Encampment Creek		800	2500	Fall in 3 mile section
Encampment Creek		610	2980	Fall in 5½ mile section

GENERAL STATEMENT OF POWER POSSIBILITIES IN UPPER GREEN RIVER BASIN ABOVE GREEN RIVER, WYOMING

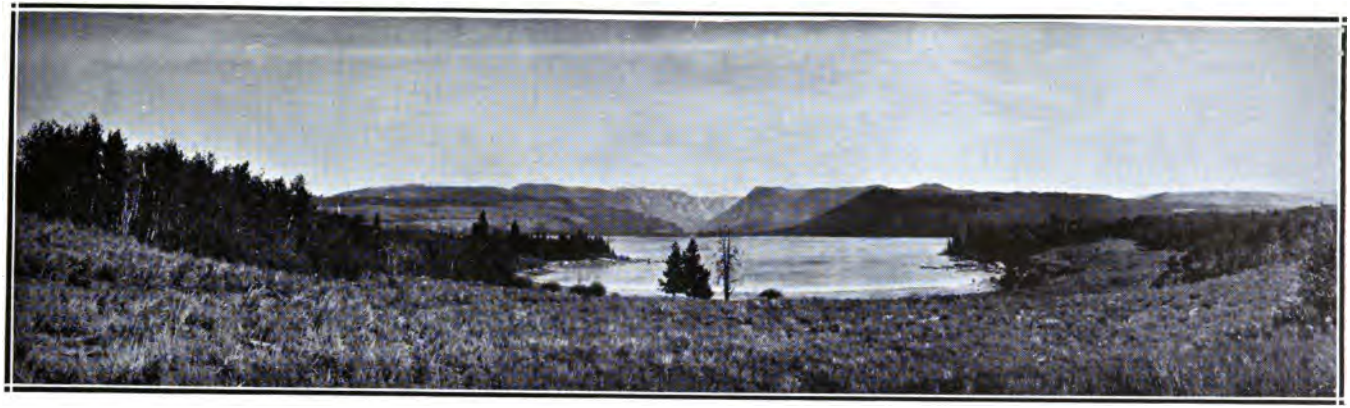
By Ralf R. Woolley, Hydraulic Engineer,
U. S. Geological Survey

For a distance of 148 miles following up the course of Green River above Green River City, Wyoming, the stream flows in a broad "U" shaped canyon cut through vast stretches of "Bad Lands". It falls less than 10 feet to the mile for the greater part of the distance and winds through bottom lands which are covered with a heavy growth of willows.

Above the mouth of Horse Creek its fall is more rapid and in several places the valley contracts in width to such an extent that dams may be built across the channel.

Assuming that the foundation conditions are suitable for feasible developments at these sites, it is estimated that about 320 feet drop can be utilized at three dam-sites, and for ninety per cent of the time 4,000 horse power can be developed.

In the case of the streams tributary to Green River, those draining the west slopes of the basin are not so good for power



New Fork Lake

Green River Lake

STORAGE POSSIBILITIES

NU

purposes as the ones entering from the east, which drain the west slopes of the Wind River Range. Here numerous glacial lakes feed the streams, and supply a more constant stream flow, and in many instances a cheap means of stream flow regulation if developed as storage reservoirs.

No less than six of these lakes could be developed cheaply as reservoirs, and the stored water would not only be available for power development but also for irrigation. The power which could be developed under these conditions would be from 9,000 to 10,000 horse power for ninety per cent of the time.

The storage capacity of these lakes, even with low dams, is great enough to equalize the total run-off of the streams and will permit of a total power development for the basin within a radius of fifteen miles of 13,000 to 14,000 horse power.

While this amount of power is not large when considered along with the enormous developments of today, it is an asset to the basin and will likely be sufficient to supply the future needs of that locality for all prospective industrial development.

At the present time the market for power is limited to a few very small settlements scattered over a large area so that the revenue that could be expected from even a small development would not warrant the initial cost attending long transmission lines, etc. It is possible, however, for the small communities situated near the power sites to utilize some of the available power for their own needs.

In several instances small hydro power plants have been built on the upper parts of the streams for operating saw mills, and most of the streams will furnish enough power to do this but these mills of necessity are quite far back in the timbered areas, and the stream flow is too small to develop enough electric power to pay for its transmission to a market. In view of this fact, only those power possibilities which are easily accessible and considered the most feasible are included in the above estimates.

APPLICATIONS FOR PERMITS

By Seymour S. Sharp, Assistant State Engineer

As part of his duties in connection with the general supervision of water rights within the State of Wyoming, and administration of the irrigation laws, the State Engineer is charged with the duty of granting permits which constitute authority for the undertaking and perfecting of new appropriations. The work of checking in detail applications for permits and bringing them to proper form for definite action by the State Engineer comes within the duties assigned to the writer. During the two year period ending November 30, 1920, applications for permits have been filed to the number of 1251. Of these approximately 1200 have been examined, and over 900 have been approved to date, and permits issued thereunder. Eleven applications have been rejected for various reasons, and six filings have been cancelled, either at the request of the applicant, or through failure to return the applications within the required time after they had been sent back for correction.

Of the applications on which no action has yet been taken, practically all will be approved when additional information is supplied or steps are taken to remove conflicts with existing rights which now prevent their approval. Not more than thirty per cent of the applications when filed are in suitable form or give sufficient information to warrant their immediate approval. The reason which in most cases prevents immediate favorable action is that of conflict with existing rights; in the case of ditch applications, with rights in good standing for the irrigation of the same lands; in the case of reservoir applications, with existing rights for the construction of reservoirs at the same sites. In the majority of such cases, the earlier rights are found to have been either abandoned or never perfected, and approval of the applications is withheld until the State Engineer is convinced that the existing rights are no longer in effect. If immediate action were in all cases required by the applicants, a large number of the applications filed would be necessarily rejected by reason of these conflicts. The remaining applications that cannot be granted at once are held until more complete information as to the nature and circumstances of the proposed appropriations is secured, or until they conform to the requirements of the law and the regulations of the State Engineer. It is the desire of this office to have all applications in the best form possible before permits are issued which become a permanent record, so as to avoid any possible misunderstanding by those who will use these records in the future as to the exact nature of the rights conferred.

In the case of applications for permits for the appropriation of water from springs, this office has taken the position that the granting of rights to individuals for the only springs available for public use, especially where these springs control a large amount of open range, might prove detrimental to the public interest. The applicant should therefore state either in the application or in an accompanying letter the ownership of the land on which the spring is located, and if it is on land other than his own, the use which is made of the spring and the general situation applying thereto at the time of filing of his application.

Applications which are not suitable for immediate action are generally held on file until additional information can be secured and the necessary corrections made. During the earlier administration of this office, the same care as is now exercised in the examination of applications for permits was not taken, and as a consequence many errors and conflicts appear in the records of the early rights. As regulations for filing applications have become more strict, and examination of applications more thorough, this condition has gradually diminished to a great degree, until at the present time recorded permits and accompanying maps give reliable information regarding the rights and proposed works for all future time. It is the prime purpose of this office to protect in every way possible the interests of water-users within the State. No requirements or regulations are made merely to enforce technicalities, but all are designed rather to aid the applicants in securing appropriations which are valid and unquestionable. As more land is brought under irrigation within the State each year, and streams become more heavily appropriated, the importance of having a complete record of all water rights, accurate in every detail so that proper administration is possible, cannot be overemphasized.

Report of the Secretary of the Board of Control

Cheyenne, Wyoming, October 20, 1920.

Hon. Frank C. Emerson,
State Engineer,
Cheyenne, Wyoming.

Dear Sir:

The following is a report of the work undertaken by this office during the past biennial period:

Four regular and two special meetings of the Board have been held during this period, and a large volume of routine work transacted. The work of the Secretary consists principally of checking proofs, issuing certificates and orders of the Board, and indexing, checking and filing various petitions and papers.

The usual number of proofs of appropriation of water have been presented for consideration, and 1277 certificates issued therefrom, while eighty proofs have been withheld. Numerous petitions for correction of certificates of appropriation to agree with conditions on the ground, for change in location of headgate, and for elimination of non-irrigated lands, have been considered and granted.

Many petitions for declaration of abandonment of rights have been brought before the Board. These require a great deal of time and minute attention, as all evidence and testimony taken at the hearing before the Division Superintendent must be examined and considered by the Board before a final decision is reached. All such petitions have been given the most careful consideration and deliberation, with the result that some rights have been declared abandoned in whole or in part, while other petitions have been rejected on the grounds of insufficient evidence to warrant the Board in declaring the rights forfeited. Some decisions of the Board in abandonment proceedings have been appealed to the District Court. To date but two Court decisions have been handed down, both decrees sustaining the action of the Board.

One of the most interesting proceedings that has come before the Board was the proof of the Mitchell Irrigation District. This proof was considered, and certificates of appropriation ordered granted to one hundred and thirty-two appropriators thereunder, in April, 1920. The proof was first presented to the Board of Control for consideration following the adjudication of the North Platte River in 1906. No action was taken on the proof at that time, and at a later date the Board was advised by the Attorney General that it was without jurisdiction to enter any decree respecting said canal, inasmuch as all lands irrigated thereby are located in the State of Nebraska. Upon appeal by the Irrigation District, the Supreme Court of the State of Wyoming, under date of May 15, 1914, entered its decision as follows: "In an adjudication under the statute of the priorities of right to the use of water from an interstate stream, where proof of appropriation has been filed for the irrigation of lands in the adjoining State through the diversion of water from the stream in this State, the Board of Control has jurisdiction, and it is its duty to act upon such proof and determine whether under the law the applicant has a water right, and the Board may be required to act in the matter by mandamus." Following this decision of the Courts, the Board at its meeting of April, 1920, ordered that the proof of the Mitchell Irrigation District be accepted, and certificates of appropriation issued to the various appropriators for the irrigation of 13,603.5 acres of land in the State of Nebraska.

Over 13,000 notices were sent out by the Division Superintendents to fill the requirements of the statute passed by the 1919 legislature, whereby it was required that final proof must be made on or before February 14, 1921, under all permits which had expired before February 14, 1919. By reason of lack of sufficient information in the files of the Superintendents, it was necessary to have these notices prepared in this office. This entailed a large amount of work, and a considerable expense that was not provided for in the contingent funds allowed this Department. These notices served the good purpose of calling the attention of water users generally to the matter of their water rights, and caused them to inquire rather carefully into the same. The further purpose of clearing the records in the State Engineer's office to a considerable extent was accomplished as many notices of cancellation under permits that have been abandoned were received as a result.

In the matter of the readjudication of rights on Horse Creek and Crow Creek and their tributaries, in Water Division No. 1, referred to in our last report, the case was appealed to the Supreme Court, and went by default in procedure, with the consent of the Attorney General.

Respectfully submitted,
JULIA BARTLETT FREEBORN,
Secretary, State Board of Control.

Report of Superintendent, Water Division No. 1

Douglas, Wyoming, November 27, 1920.

Hon. Frank C. Emerson,
State Engineer,
Cheyenne, Wyoming.

Dear Sir:

In compliance with your request, I herewith submit my report as Superintendent of Water Division No. 1.

The regular schedule trip over the Division was not made by my predecessor during the fall of 1919 on account of the exceptionally dry spring and summer, it being evident that very few appropriators would be able to submit proof for the beneficial use of water.

Upon assuming the duties of the office July 1, 1920, a schedule was prepared for a trip covering all the principal towns of the Division. This was done in order that a more intimate knowledge might be obtained of the territory, and at the same time offer an opportunity for those persons living far out and in isolated sections to submit proof.

The notices to water appropriators, including a copy of this schedule, was sent out from the office of the State Engineer to all permit holders, whose permits would expire by December 31, 1920.

There were turned over to me by my predecessor thirty-two proofs of appropriation. One hundred sixty-five proofs were taken on the schedule trip and about fifty have been taken since that time. Of the above number, one hundred and seventy were advertised, approved by the Board, and the Secretary instructed to issue Certificates of Appropriation for the same.

For the season of 1920, there was a plentiful supply of water and very little trouble was experienced by the Water Commissioners of this Division.

In connection with its project near Douglas, Wyoming, the Douglas Reservoirs Company has obtained some information of general interest in reference to the question of water supply. The 1920 season was the first season for which it has been possible to obtain complete data of the run-off above the Reservoir on La Prele Creek, and this data is presented herewith by permission of the Company.

The snow data for the winters 1919-20 was carefully compiled for this area and the company was able to estimate very closely the amount of run-off to be expected for the flood season. The estimate thus arrived at was 38,000 acre feet, and the actual run-off for the year from the record of the U. S. R. S. Gauging Station above the reservoir was 43,200 acre feet.

Another interesting feature in connection with this project is the fact that about thirty second feet of prior appropriations below the reservoir is entirely taken care of by seepage and return flow from this project, and many late rights, which before the construction of the dam received only a small amount of water, now enjoy as good a right as the older ones. This emphasizes the fact that the later rights on all streams will increase in value each year as more lands are irrigated above them.

The total amount of water delivered to settlers under this project during the irrigation season of 1920 was 13,848 acre feet delivered to about 8,000 acres of land, and in only two cases the amount delivered to a contract was in excess of two acre feet per acre of irrigable land. It is my opinion from the results obtained this year that the duty of water in this vicinity will come well within the limit of two acre feet provided as a maximum in the water right contracts of the Douglas Reservoirs Company.

The method used in measuring the water under this system was by use of the rectangular weir and submerged orifice with bottom contraction suppressed. The rectangular weir was used below the steel gates of the main canals and the orifice was used in all lateral outlets, both being provided with locks and locking devices. In the construction of the latter the head gates and measuring devices with stilling wells were built in one structure and the results obtained from both methods were very satisfactory.

It is my opinion that some similar method will eventually be worked out for the distribution of water from all the streams of the State, as there are always those who will take advantage of any lax method used and in many cases over-irrigate their land to their own detriment and at the expense of their neighbors.

Respectfully submitted,

L. C. BISHOP,
Superintendent Water Division No. 1.

Report of Superintendent, Water Division No. 2

Sheridan, Wyoming, November 30, 1920.

Hon. Frank C. Emerson,
State Engineer,
Cheyenne, Wyoming.

Dear Sir:

I beg to submit in the following my report as Superintendent of Water Division No. 2, for the years of 1919 and 1920.

The season of 1919 was an extremely dry one, necessitating the regulation of water of all the smaller streams as early as April. There having been a very light snowfall in the mountains the previous winter, the larger streams showed a weakness soon after, and many ordinarily good rights were without water early in June, resulting in the heavy loss of crops throughout this entire Division. On account of the shortage of water, there were a great many disputes among water users. These, and the fact that several of the Water Commissioners were new at the work, kept me almost constantly in the field from early in May until October. Looking after the storing and releasing of water in the various reservoirs, located in the Big Horn range of mountains, adds materially to the field work in this Division.

You will remember of having accompanied me, in August, 1919, on one of these mountain trips, at which time you inspected all reservoirs, dams and outlets and made suggestions, and, also in some cases, requirements, which in most instances have been complied with. Your method of visiting and inspecting these larger projects on the ground, getting acquainted with the water users, and pointing out as you have improvements that will benefit them in the future, is appreciated by both water users and officials.

The season of 1920 was the opposite extreme of 1919, there having been a heavy snowfall in the mountains the previous winter, reported to be eleven feet, which furnished an abundance of water throughout the entire season and a bumper crop was harvested on both dry and irrigated farms.

The benefits of stored water were thoroughly demonstrated during the season of 1919, and caused many investigations to be started with the view of locating practical reservoir sites. How far these investigations were carried out, future development will show. An interesting project, one that thoroughly demonstrates the benefits and value of stored water, is the Cloud Peak Reservoir, located at the foot of Cloud Peak in the Big Horn range of mountains, on the South Fork of South Piney Creek. Although built under the handicap of having to transport all material and equipment with pack horses some thirty or thirty-five miles over very steep and rocky trails, it repaid every dollar of its cost in the first four years of its use.

An important project now under construction, and by far the largest in this Water Division, is that of the Lake De Smet Reservoir, which is being built by the L. Z. Leiter Estate. This reservoir, when completed, under present plans, will store approximately twenty-five thousand acre feet of water, furnishing not only a supplemental supply for the large tract of land owned by this estate, but will be ample to reclaim thousands of fertile acres additional along the Clear Creek Valley

In connection with the regulation of water, valuable aid would be rendered by placing in streams, especially those carrying stored water, a weir, rating flume or gaging station, above all diversions. Any one of these would prove of great value to the Commissioner in the distribution of water and settling of disputes, for by this means he could tell just what rights could be furnished and a dissatisfied user could be shown the exact strength of the stream. In order to show the necessity for such measuring device, we have only to mention one stream, Little Goose Creek, into which the water of five different reservoirs are released in various quantities and with frequent changes.

Respectfully submitted,
C. W. STROUD,
Superintendent Water Division No. 2.

Report of Superintendent, Water Division No. 3

Basin, Wyoming, November 26, 1920.

Hon. Frank C. Emerson,
State Engineer,
Cheyenne, Wyoming.

Dear Sir:

I am submitting herewith my report of the work of this office for the past two years.

For the year 1919 there was the usual routine work, mostly that of taking proof of appropriation, and the handling of the heavy correspondence of the office.

This work grows each year and is one of the heavy burdens, in view of the fact that the Superintendent is required to be out over his Division much of the time, so that, while the correspondence is large and constantly increasing, much of it must be neglected for days and weeks at a time because of this required absence. However, it has been kept as near up to the minute as possible.

When one considers that the correspondence is an important part of the work of this office, one can realize the necessity for keeping in as close touch with it and the people as possible. Much work can be accomplished by this means that saves time and travel, as well as expense, especially where it refers to records, laws or customs of the Board of Control.

It is well understood that this is not an office of record, yet it should be. We have overcome this fault, to a certain degree, by having a system of card indexes concerning all permits issued from the office of the State Engineer. This is good when kept fully up to date, but unfortunately the card records in this particular office have not been kept that way. I find many records with no data on them, where proof has been made in the last few years; hence one is compelled to go over this large mass of work only to find that much of it has been taken care of in some way. Also I find many permits throughout the country where this office has no such record at all, so that this card system has proven nearly worthless in the past year or more. To overcome this, there must be a new set of index cards made up from the records in the office of the State Engineer that will bring everything up to date; it will then be of real value.

Drought Conditions

As is well known, the year 1919 was one of unusual drought conditions. Streams that had never given any trouble before were short of water from early in the season until late fall, while streams that are always short during the late season were nearly dry from June 1st until October. This caused a heavy loss of crops all over the country and entailed an endless amount of work on the administration of the law governing water rights.

Water Commissioners and deputies were kept at work for a longer period than ever before, and yet were unable to accomplish the desired results. In this Division such streams as the Greybull and Owl Creek, as well as most of the smaller ones, were not only shorter of a supply than ever before known, but the loss of crops was greater than in the history of irrigation in this country. It was extremely difficult to handle the water because of the fact that the supply was so short it could not be carried full length of the stream as priorities dictated. This was particularly true of a stream where early priorities were near the mouth, and most streams have just such located priorities.

Again it was very difficult to get Commissioners or assistants to do this work for the money allowed by law. A Commissioner is allowed $5.00 per day and necessary expenses, and an assistant is allowed but $4.00 per day and pay his own expenses. This made it very difficult to get men at all who would do the work.

In this connection I would recommend that the law be so amended that a Commissioner and assistants be paid a sum commensurate with the importance of the work. By doing this, we can get men who will give their undivided attention to this highly important part of the water administration.

Public Opinion

This office found another, and in some measure a surprising difficulty in the distribution of water. Numerous arrests were made for unlawfully taking water. On one stream there were perhaps fifteen such arrests and only one conviction, though the evidence in the cases was not questioned. The juries, however, seemed to feel that it was no crime to take water belonging to another to save a man's own crop.

This may be taking a sympathetic view of the man who is trying to grow a supply of provisions for the good of his wife and children, but it is rather hard on the man, wife and children who are legally and rightfully entitled to the water who thus lose their crops. In addition, it brings the water laws into disrepute and makes the administration thereof extremely difficult.

I have in mind another case where a man was arrested for taking water unlawfully. He told the justice before whom the case was tried, as well as the spectators, that he did do as was charged in the warrant. He claimed he was justified in doing so, and the jury divided on the question of his guilt and nothing further has ever been done in the matter.

Another man was caught opening his headgate after it had been lawfully closed. This was in June, 1919. The attorney of that county asked to have the matter taken directly to the District Court, and the warrant was sworn to in accordance with his desires. That has been a year and a half ago, and nothing has ever been done in the case, so far as I know, or the records show.

These statements are not made so much in criticism, as to show the condition of the public mind on such matters. There seems a decided disposition not to want to punish such cases of law breaking. It is very difficult to enforce the law in the face of this opposition of so many people. The present law for the distribution of water seems ample, and as a rule local officers in charge have honestly tried to do their duty, and in spite of this one serious condition have performed their work more than well. The people must realize the necessity of lending their aid to the proper working of the law, when a better distribution can be made, and have the law fully respected.

Small Reservoirs

For many years the writer has been keenly interested in the building of small reservoirs, near the streams, and during the past year has made a special study of such conditions in numerous localities. I feel very confident that such streams as Owl Creek, Muddy, and in fact most streams, could be turned into reservoirs located a short distance away, and thus materially increase the supply at a fairly reasonable cost.

I found one reservoir on Muddy that holds a large amount of water, and that can easily be made to hold more, up to the limit of supply. This reservoir is near the head of Muddy and belongs to the Bar Gee Live Stock Company. There are two other such sites on this stream that can be made to add much to the general supply, and no doubt other sites could be found on a thorough investigation.

This same thing will apply to Owl Creek, though the sites there are not so good as along the Muddy. My judgment is that the people will have to make a decided effort to construct such reservoirs, on the smaller streams, because of the almost prohibitive cost of the large enterprises. The State could well afford to render every assistance possible in this highly important matter.

Consolidation of Ditches

Another matter of vital importance to the State as a whole, and the people, is the consolidation of many small ditches into one large one. Such streams as the Greybull, Big Popo Agie, and in fact most streams, have many ditches where one would do the work better and at a great saving of water and cost of maintenance. In the Popo Agie Valley above Lander are two ditches less than ten feet apart, for nearly their full distance. Two others in the same vicinity are very close together, while numerous small ones are not far away. The cause of this condition, in many cases, is some personal feeling, but, whatever the cause, the condition is bad. To make consolidation easy in that one particular locality, there is one large canal as far up the stream as can well be built that would afford an excellent conveyance for water for all the land on that side of the stream. It would give an abundant and constant supply of water, with a maintenance cost that would be materially lessened, for every acre under cultivation. It would also eliminate many ditches now running through good farm lands, that would add much to the value of the farm, and reclaim many valuable acres now too wet for agriculture.

The Greybull Valley affords the same opportunity where many ditches could be abandoned and the water run through the Bench or Farmer's Canal, thus overcoming a heavy seepage and evaporation, as well as cost of operation. The same thing would be true on the opposite side of the stream, where many rights could be consolidated with the St. Joe Ditch. It may take a long course of education to convince the people of the great advantage, but it should be done.

Abandoned Rights

I have found many abandoned rights throughout the entire Division. In some cases the rights have been fully abandoned, and in other cases the water has been used through another conveyance without due process of law. In the latter case the matter can be straightened out by having the rights properly transferred from one canal to another, that is, changing the point of diversion. This is not a difficult proposition, but must be done to preserve the right. This office has made a special point of informing the people, where this condition exists, what they should do and what must be done. Some are taking advantage of this information and taking the required steps.

In many cases the rights have been abandoned entirely, yet no abandonment proceedings have ever been held, so that the rights stand of record as good as they ever were. The State has no authority to initiate proceedings to have these rights declared abandoned, and the people evidently are not enough interested in the matter to do so. In the distribution of the water, this fact is recognized as far as possible, and the water properly regulated regardless of the record, but in accordance with the facts as they exist on the ground. In an extreme shortage, this condition becomes very troublesome. It would seem a wise thing to have some method whereby the State could start proceedings and declare abandoned such right, where the people do not take the required steps.

Indian Rights

There is another question that confronts this office that is of vital importance, both to the State and to the people directly interested, that no other part of the State is so closely concerned with, and that is the matter of Indian rights, or water rights on the Shoshone Reservation, and the ceded part thereof.

It has always been and is now, the contention of the State, that the State owns the waters of the State, according to its consitution, said consitution having been approved by Congress when Wyoming was admitted into the Union.

The government has in many ways recognized this right by making the proper application to the State Engineer for the use of water, and insisting that proof of appropriation be made under such permits. However, when the State attempts to divide the waters on the reservation the government steps in and through its federal courts enjoins the State from interfering with the rights on Indian allotments. This leaves matters in a very chaotic condition. The State is enjoined and the government is extremely neglectful of dividing the water, so there seems to be no control of the Indian and he takes all the water he wants.

For the good of the Indian and his successor, and of the State, the control of all the water should be in the State. The State is organized to handle the water and does do so, while the Government is not so organized and does not properly divide the water.

The trend of most court decisions is to give the water to the Indian land regardless of the time when this water may be used, and dating the priority of such right superior to any or all State rights.

In view of this fact, and from the further fact that if the State went to court for its rights it would make a long and expensive suit, the writer would suggest a joint commission, appointed by the government and the State, to settle the matter. This could easily be done, and even though the Indian lands were given the superior rights, the control thereof would undoubtedly be left with the State. This is a very important question and demands immediate attention.

Contingent Expenses

A serious handicap to the work of this office for the past two years has been the lack of funds for contingent expenses. When one realizes that the Superintendent must travel over the entire Big Horn Basin, as well as Fremont County, and some of it several times a year, both by rail and automobile, as well as paying hotel and other expenses, it would be easy to understand that $1,000 per year is not sufficient.

This is the most important work in the State, and yet the smallest fund is provided for its administration. Rather than that, there should be a fund fully commensurate with its importance, so that the Superintendent could go at all times, when called or needed, without having to count the cost. In addition to the traveling expenses, there are many other items, such as postage, office rent, and more or less equipment for the office that must be provided for.

I would recommend a fund of at least $2,000 per year, as well as an automobile for the service.

Appreciation

I wish to express my appreciation to you and the clerical force in your office, as well as the Secretary of the Board of Control, for a prompt and helpful consideration, without which it would be very difficult to carry on this work.

Respectfully submitted,
LOU BLAKESLEY,
Superintendent Water Division No. 3.

Report of Superintendent, Water Division No. 4

Evanston, Wyoming, November 30, 1920.

Hon. Frank C. Emerson,
State Engineer,
Cheyenne, Wyoming.

Dear Sir:

I respectfully submit herewith my report as Superintendent of Water Division No. 4 for the years 1919 and 1920.

The year 1919 has perhaps gone on record as being one of the driest ever experienced in the western part of the State, as well as generally throughout the entire western country. As a result of this extreme water shortage, the question of distribution in the streams was an important one to the water users and the State at large. I believe the situation was well handled by the officers in charge of this Division with the assistance received from your office. While the loss to the ranchers and stockmen was severe, it was unavoidable and reduced to a minimum in so far as the water distribution was involved. The call for regulation in water distribution throughout the Division commenced very early and continued during the entire irrigating season. The year 1920 has been normal and the water supply, generally speaking, was sufficient to care for the wants of the users until the irrigating season was well along, thus reducing the work and expense incidental to the distribution thereof. However, there are districts where the streams supplying the water are over appropriated and the services of the Commissioners are required almost constantly after the high water season has passed.

The question of employing practical men as Water Commissioners during the above period has been serious, owing to the abnormal wage conditions existing throughout the country. A Commissioner, being the man on the ground, represents one of the principal branches of the Water Department, and it is upon his judgment and action that the successful operation of the law relative to the distribution of water depends to a large degree. Therefore, I believe the laws governing the per diem of Water Commissioners, and the per diem and expenses of Deputy Water Commissioners, should be so adjusted that it will be possible for the State to secure the services of competent men to fill these positions in the future as it has done in the past.

During the above period I have covered the entire Division twice for the purpose of accepting final proof upon water rights standing under permit. At each time notice was first given by letter and advertisement to all interested parties advising them of the dates upon which I would be in certain localities. Two hundred and six proofs were taken and presented to the Board of Control for approval and issuance of final certificates. Fifty-five proofs taken are now on file in my office for presentation to the Board at its next regular meeting. Three abandonment hearings were held and the testimony taken submitted to the Board of Control for final action.

The matter of ordering the installation of headgates in all ditches and water works has progressed, and is complete in several districts at this time. It is my intention to complete the sending of notices to all water users in the Division during the coming year. Thereafter strict enforcement of the law relative to headgates will be made.

For the purpose of conserving the available water supply of the streams in Star Valley systems have been undertaken consolidating the headings of the different ditches, several of which are in use at the present time. The owners of these works are more than satisfied with the result accomplished. This method of handling the distribution of the water of a stream, where practical, is also of great assistance to the Water Commissioner in charge and operates at a great saving to the County wherein the works are located. While the initial expense to the water users concerned is in some cases heavy, the benefit derived has more than offset it.

The dry season of 1919, while disastrous at the time, perhaps may be termed as "not without beneficial results" when the matter of reservoir water supply is considered. As a result of the shortage of water experienced, many of the users, fortunate to be located where the construction of a reservoir is possible, have commenced work in some form towards the development of such project. The following projects in Division No. 4 are either under construction or in the course of organization, and, although small, represent a step in the right direction if the waters are to be held in the proper place until needed for irrigation or other purposes: North Piney Reservoir, Middle Piney Reservoir and New Fork Lake Reservoir. Water stored in these reservoirs will be used largely for supplemental supply, the lands irrigated lying entirely within the State of Wyoming.

The water users in the Black's Fork country are perhaps more in need of storage water than those of any other part of Division No. 4. Black's Fork River and its tributaries are over appropriated and as a result it is impossible to reclaim all the lands lying within the irrigable area. Notwithstanding this fact, large tracts of land are being covered under new canal and ditch systems. The question of administration is therefore growing more difficult from year to year; and the spirit of ill feeling among the water users themselves and the water officers is increasing. I believe the construction of a reservoir in this district possible, although it would more than likely lie within the State of Utah. If constructed, it would reclaim many acres of land and insure a sufficient supply for the irrigation of the lands now under cultivation. While the water users and interested parties have held several meetings relative to the matter, I do not believe any concrete plan has been adopted. It is my opinion that their first step should be to make sure that a reservoir of the desired capacity is possible, by having the site surveyed. If it is found feasible then, under our present irrigation laws, I believe the project can be completed.

In conclusion, I wish to express my thanks to your office for the assistance which has been given me in the performance of my duties.

Respectfully submitted,
M. I. McCUAIG,
Superintendent Water Division No. 4.

SUPPLEMENT "A"

Permits Issued by the State Engineer

FIFTEENTH

BIENNIAL REPORT

OF THE

STATE ENGINEER

OF

WYOMING

1919-1920

LARAMIE, WYOMING:
THE LARAMIE PRINTING COMPANY
PRINTERS AND BINDERS
1921

Permits to Appropriate Water Issued During the Two Years Ending September 30, 1920

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15237	4	Marion J. Meeks	Rocky Spring	.28	16	13	115	50.00	5.00	1919
15238	2	J. J. Klodt	Beaver Creek	2.61	18	44	62	6,000.00	S. Supply	1921
15239	3	Chas. Spear	Five Springs Creek	.729	10	55	94	228.00	74.60	1920
15240	3	Chas. Spear	Five Springs Creek	.695	10	55	94	275.00	25.80	1920
15241	4	Henry Watts	Pole Creek	1.221	24	25	117	150.00	37.00	1919
15242	4	Henry Watts	Pole Creek	1.127	24	25	117	140.00	35.60	1919
15243	4	Henry Watts	Pole Creek	.511	23	25	117	75.00	19.20	1919
15244	4	Mary E. Dempsey, et al.	Willow Creek	1.335	10	36	114	250.00	62.00	1919
15244½	3	Midwest Refining Co.	Big Horn River	.216	17	52	93	2,000.00		1920
15245	3	Midwest Refining Co.	Big Horn River	.059	17	52	93	2,000.00		1920
15246	3	Midwest Refining Co.	Big Horn River	.08	17	52	93	2,000.00		1920
15247	3	Midwest Refining Co.	Big Horn River	.06	17	52	93	2,000.00		1920
15248	1	Mabel E. Harris	Crooks Creek	1.203	8	27	92	250.00	30.10	1921
15249	1	Leonard R. Kingham	Draw No. 2	2.00	36	16	85	175.00	33.00	1920
15250	1	Leonard R. Kingham	Draw No. 1	.263	36	16	85	47.00	S. Supply	1920
15251	1	E. R. Spicer	Holman Draw	.52	28	33	79	400.00	41.50	1920
15252	1	Maud M. Bell	Branch of Casper Creek	1.20	25	33	87	300.00	64.00	1921
15253	2	Wm. P. Parks	N. Fk. Little Missouri	.96	35	57	68	350.00	21.00	1921
15254	4	Wm. Krall	N. Fk. Fontenelle Creek	3.237	36	26	116	900.00	64.00	1921
15255	4	Robert Krall	Branch N. Fk. Fontenelle Creek	.657	12	25	116	100.00	36.00	1921
15256	4	Robert Krall	Branch N. Fk. Fontenelle Creek	.234	12	25	116	150.00	32.00	1921
15257	4	Mrs. Dean Hatch	Smiths Fork Creek	.757	21	15	114	43.00	71.00	1920
15258	4	Ignatz Pikl, et al.	S. Fk. Fontenelle Creek	4.205	23	25	116	1,000.00	195.00	1921
15259	4	Mrs. Dean Hatch	Slough Smiths Fork Creek	.114	21	15	114	25.00	14.50	1920
15260	4	Mrs. Dean Hatch	Smiths Fork Creek	.162	21	15	114	30.00	29.00	1920
15261	4	Mrs. Dean Hatch	Smiths Fork Creek	.08	21	15	114	25.00	8.00	1920
15262	4	Mrs. Dean Hatch	Smiths Fork Creek	.49	22	15	114	30.00	36.50	1920
15263	1	P. T. Olson	Spring	.30	17	23	88	100.00	15.00	1920
15264	1	P. T. Olsen	Bell Spring Creek	.75	20	23	88	300.00	50.00	1920
15265	1	Reubon Rowse	Rock Creek	1.38	35	29	99	350.00	27.00	1920
15266	2	Allen Oil Company	Twin Springs	1.00	31	36	64	1,500.00		1920
15267	3	C. R. Chown	Muddy Creek	.80	35	5 N.	2 E.	275.00	16.00	1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15268	3	Wm. J. Behrend	Muddy Creek	.90	1	4 N.	2 E.	275.00	67.00	1920
15269	4	T. W. Boyer, et al.	Fifteen Mile Spring	3.352	12	21	101	5,500.00		1923
15270	4	T. W. Boyer, et al.	Leucite No. 1 Spring	3.437	7	21	101	5,700.00		1923
15271	4	T. W. Boyer, et al	Leucite No. 2 Spring	2.84	18	21	101	4,000.00		1923
15272	4	T. W. Boyer, et al	Leucite No. 3 Spring	3.079	18	21	101	4,500.00		1923
15273	4	T. W. Boyer, et al.	Leucite No. 4 Spring	3.12	19	21	101	4,600.00		1923
15274	4	Neil E. Durnford, et al.	Hoback River	1.156	10	36	114	600.00	174.00	1920
15275	4	James Hopkins	S. Cottonwood Creek	.946	7	32	113	175.00	39.00	1920
15276	4	Wm. C. Chall, et al.	South Beaver Creek	4.012	18	35	113	2,500.00	547.00	1921
15277	1	Isabelle M. Keller	North Platte River	1.00	17	31	69	1,500.00	79.00	1921
15278	1	Mabel I. Hill	Draw	.61	36	25	68	100.00		1920
15279	1	Mabel I. Hill	Draw	.58	30	25	67	25.00	S. Supply	1920
15280	2	Town of the City of Newcastle	Beaver Creek	1.32	29	47	60	9,000.00		1921
15281	1	Jessie Corpening	Lone Tree Hollow	1.25	6	16	82	200.00	130.00	1920
15282	1	Davis and Thomas	Harney Creek	1.20	31	15	73	175.00	138.46	1920
15283	1	Davis and Thomas	Harney Creek	1.60	31	15	73	200.00	144.52	1920
15284	1	Tony Alameda	Fillmore Creek	.75	10	20	91	200.00	20.60	1921
15285	1	Warren D. Healey	Bear Spring Creek	1.09	14	29	82	400.00	20.00	1920
15286	2	Neil Beaton	Stove Gulch	1.50	14	38	79	410.00	43.44	1920
15287	1	Natural Epsom Salts Co.	Well		32	31	72	100.00		1920
15288	1	Natural Epsom Salts Co.	Wagon Hound Creek	1.627	32	31	72	8,000.00		1920
15289	1	Natural Epsom Salts Co.	Poison Creek	.06	4	30	72	100.00		1920
15290	3	Carl Sears	Mexican Creek	.17	29	6 N.	4 E.	45.00		1922
15291	3	Carl Sears	West Prong Mexican Creek	.19	31	6 N.	4 E.	50.00	2.50	1922
15292	3	Carl Sears	Branch of West Mexican Creek	.10	31	6 N.	4 E.	40.00	2.50	1922
15293	3	Carl Sears	Mexican Creek	.07	32	6 N.	4 E.	20.00	6.25	1922
15294	3	Elihu Bean	Stagner Creek	1.03	1	5 N.	4 E.	125.00	28.00	1921
15295	3	Elihu Bean	Stagner Creek	.11	12	5 N.	4 E.	20.00	1.50	1921
15296	3	Kathryne S. Gardner	Gardner Springs No. 1	.70	14	42	91	50.00	27.40	1922
15297	3	Kathryne S. Gardner, et al.	Gardner Spring No. 1	2.42	15	42	91	500.00	271.00	1922
15298	3	Kathryne S. Gardner, et al.	Gardner Springs No. 1	2.96	35	42	91	200.00	298.40	1922
15299	3	Kathryne S. Gardner	Lake Creek	1.68	13	42	91	400.00	S. Supply	1922
15300	3	Kathryne S. Gardner, et al.	Gardner Spring No. 2	2.96	26	42	91	25.00	S. Supply	1922
15301	3	C. H. Gardner	Gardner Spring No. 1		19	43	91	25.00		1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15302	3	C. H. Gardner	Gardner Spring No. 2		19	43	91	25.00		1920
15303	3	Margaret Duane	Deweese Spring	.20	35	43	95	700.00	1.30	1921
15304	3	Margaret Duane	Deweese Spring No. 2	.20	35	43	95	700.00	1.30	1921
15305	3	Margaret Duane	Deweese Spring No. 3	.20	35	43	95	700.00	1.30	1921
15306	3	Margaret Duane	Deweese Spring No. 4	.20	35	43	95	700.00	S. Supply	1921
15307	3	Margaret Duane	Deweese Spring No. 5	.20	35	43	95	700.00	S. Supply	1921
15308	3	Margaret Duane	Deweese Spring No. 6	.20	35	43	95	700.00	S. Supply	1921
15309	3	Margaret Duane	Deweese Spring No. 7	.20	35	43	95	700.00	1.30	1921
15310	1	Harold A. Clarkson	Iron Creek	.275	9	32	82	100.00	S. Supply	1922
15311	1	Harold A. Clarkson	Iron Creek	.66	9	32	82	700.00	35.20	1922
15312	1	Wm. Atkinson	Clarks Draw	.528	22	24	72	40.00	27.70	1919
15313	1	Wm. Atkinson	Clarks Draw	.98	22	24	72	71.00	47.80	1919
15314	2	M. D. Woolery, for Ohio Oil Co.	Seepage water of Lance Creek	3.41	27	36	65	10,000.00		1920
15315	2	Ohio Oil Company	Lance Creek	.50	26	36	65	1,500.00		1920
15316	2	Ohio Oil Company	Lance Creek	1.70	34	36	65	6,000.00		1920
15317	2	Ohio Oil Company	Lance Creek	1.00	3	35	65	3,500.00		1920
15318	3	Louisa Fuller	Sand Draw	1.66	21	39	91	275.00	72.00	1921
15319	3	Louisa Fuller	Sand Draw	1.21	29	39	91	300.00	17.00	1921
15320	4	Rasmussen Sheep Co.	Red Wash Draw	.490	5	19	95	4,400.00		1921
15321	4	W. F. Hoppe	Felter Creek	.792	5	15	118	46.00	25.00	1920
15322	4	W. F. Hoppe	Albert Creek	1.599	8	15	118	127.00	90.50	1920
15323	3	Carl Stoltz	Logan Gulch	.83	3	33	93	100.00	Supply	1921
15324	4	Deronda Nebeker	Twin Creek	.75	10	21	120	125.00	164.60	1920
15325	4	Guy Sterling	Brewer Spring	.943	33	18	107	1,500.00		1921
15326	4	Adam Cooper	Circle Creek	.946	15	16	104	300.00	28.50	1921
15327	4	Adam Cooper	Circle Creek	.359	14	16	104	150.00	13.00	1921
15328	2	J. W. Shepperson	Shepperson Draw	.932	11	38	81	400.00	56.85	1920
15329	1	Mary E. Phelps	South Fish Creek	.619	8	26	70	30.00	11.40	1920
15330	3	Bessie Sparhawk	Clarks Fork River	.60	8	56	103	200.00	90.00	1920
15331	3	Bessie Sparhawk	Spring Creek	.25	7	56	103	50.00	34.00	1920
15332	3	Daniel P. Sheehan	Paradise Creek	.75	20	33	101	600.00	60.00	1920
15333	2	Emma S. Van Gorden	Ba Ba Gulch	3.06	3	41	75	300.00	120.00	1921
15334	2	Corrine Washburn	Beaver Creek	.40	6	42	61	200.00	28.40	1920
15335	2	Frank Neff	Broken Horn Creek	.65	22	40	82	400.00		1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15336	2	Frank Neff	Broken Horn Creek	1.87	22	40	82	650.00	47.00	1920
15337	1	Bair Oil Co.	Abel Creek	.45	11	26	90	10,000.00		1920
15338	1	Abraham J. Greenwood	Dry Creek	1.125	29	30	86	200.00	119.00	1921
15339	1	M. B. McKillip, et al.	Spring	.44	13	17	84	250.00		1920
15340	2	Steve A. Mahoney	Hellum Draw	.568	1	54	64	150.00	20.00	1920
15341	3	Orr Lampman	Bear Creek	1.50	3	54	92	150.00	40.00	1920
15342	3	Pearl Weston	Bretesha Creek	.50	5	51	104	150.00	33.00	1919
15343	1	Kasoming Oil Co.	Garden Creek	1.85	14	26	87	10,000.00	10.00	1921
15344	2	Texas Company	Lance Creek	1.27	3	35	65	7,500.00		1919
15345	2	Texas Company	Lance Creek	3.382	23	36	65	11,000.00		1919
15346	3	Bar Gee L. S. Co.	Maverick Spring Gulch	4.95	17	5 N.	1 W.	750.00	82.00	1921
15347	4	Grace MacGlashan	Draw	3.80	17	29	111	300.00		1921
15348	4	Grace MacGlashan	Draw	1.99	8	29	111	200.00		1921
15349	4	Grace MacGlashan	South Piney Creek	1.21	6	29	111	150.00	630.76	1921
15350	1	R. R. Wilson	Medicine Bow River	.84	21	18	80	175.00	180.00	1920
15351	2	Emma Neeves	Trail Creek	.40	13	56	87	100.00	10.80	1920
15352	3	W. S. Fiscus, et al.	Nowood Creek	3.50	2	46	88	2,000.00	385.00	1921
15353	3	G. W. Johnson, et al.	Nowood Creek	11.00	3	48	90	58,750.00	S. Supply	1922
15354	1	Alma M. Grieves	Little Camp Creek	1.35	2	27	90	200.00	80.00	1921
15355	1	Alma M. Grieves	Unnamed Creek	.75	2	27	90	25.00	S. Supply	1921
15356	1	Silvia M. Wood	S. Fk. Wood Hollow	.40	18	16	82	100.00	189.00	1921
15357	1	Green Mountain Sheep Co.	Lost Soldier Creek	.30	31	27	90	100.00	10.00	1921
15358	2	Oscar Nelson	Bull Creek	.124	13	50	82	110.00	79.1	1920
15359	2	Lonabaugh-Nelson Co.	Alder Gulch	.36	33	55	85	250.00	30.00	1920
15360	2	Lonabaugh-Nelson Co.	Hawthorne Creek	.25	4	54	85	175.00	20.00	1920
15361	3	R. J. Price	Buffalo Spring No. 1	.12	20	42	94	500.00		1921
15362	3	R. J. Price	Buffalo Spring No. 2	.12	20	42	94	20.00		1921
15363	3	R. J. Price	Buffalo Spring No. 3	.12	20	42	94	20.00		1921
15364	3	R. J. Price	Buffalo Spring No. 4	.12	20	42	94	20.00		1921
15365	3	R. J. Price	Buffalo Spring No. 5	.12	20	42	94	20.00		1921
15366	3	Bar Gee Livestock Co.	Holland Creek	.57	26	7 N.	1 W.	1,200.00	15.00	1921
15367	3	Bar Gee L. S. Co.	Spring	.08	26	7 N.	1 W.	25.00	S. Supply	1921
15368	4	Margaret M. Brannan	Branch of Bear Creek	.473	2	25	99	800.00	Supply	1921
15369	4	Margaret M. Brannan	Bear Creek	3.125	32	26	98	8,500.00	Supply	1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15370	4	Margaret M. Brannan	Bear Creek	1.705	10	25	98	500.00	246.00	1921
15371	3	Hannah Harrison	Four Mile Creek	.20	35	43	108	100.00	53.00	1921
15372	3	Alex. Osoviscki	Bench Creek	1.10	12	42	108	200.00	81.00	1921
15373	3	Alex. Osoviscki	Bench Creek	.63	12	42	108	150.00	57.00	1921
15374	1	J. M. Carey	Dry Creek	.375	29	14	66	35.00	18.00	1922
15375	1	J. M. Carey	Dry Creek	.50	29	14	66	50.00	13.00	1922
15376	1	H. W. Fisch	Branch W. Fk. Deer Creek	1.12	32	31	78	260.00		1922
15377	1	H. W. Fisch	Branch W. Fk. Deer Creek	.60	3	30	78	125.00		1922
15378	1	H. W. Fisch	West Fk. Deer Creek	2.25	33	31	78	600.00	76.00	1922
15379	1	E. E. Richlin	Red Creek	.36	35	32	80	250.00	Supply	1922
15380	4	Martha L. DeNise	W. Fk. New Fork River	2.379	6	32	108	250.00	144.00	1921
15381	1	W. C. Irvine	Quinn Spring		3	32	64	10.00		1920
15382	1	B. B. Botts, et al.	North Platte River	.20	6	27	66	50.00	17.00	1922
15383	3	H. G. Hillberry, et al.	Gooseberry Creek	3.31	33	47	97	500.00	275.00	1921
15384	3	Lizzie L. Green	Meeyero Creek	3.334	9	45	95	1,000.00	200.40	1921
15385	3	Mildred Blaha	Four Mile Creek	.44	26	43	108	100.00	29.00	1921
15386	3	Chris Peterson	Five Mile Creek	1.20	13	43	108	350.00	75.00	1921
15387	3	Chris Peterson	Spring	.18	13	43	108	25.00	75.00	1921
15388	3	T. M. Bain	East Fk. Wind River	4.46	34	7 N.	6 W.	1,500.00	173.00	1922
15389	3	Seth L. Iiams	Conant Creek	3.73	1	33	94	2,000.00	S. Supply	1921
15390	3	Seth L. Iiams	Conant Creek	.30	19	34	93	10.00	S. Supply	1921
15391	4	J. P. Nelson	Brush Creek		20	44	114	30.00	S. Supply	1920
15392	2	G. W. Moore	Baker Draw	1.00	14	55	85	175.00	S. Supply	1920
15393	2	A. H. Anderson	Anderson Draw	.70	15	55	85	10.00	S. Supply	1920
15394	1	C. W. Orchard	Aylesworth Slough	.70	11	12	91	50.00	S. Supply	1920
15395	3	J. E. Mount	Spring Creek	.85	32	49	101	100.00	98.00	1920
15396	3	R. M. Metzler	Muddy Creek	1.47	2	5 N.	1 E.	600.00	146.00	1921
15397	3	W. H. Dixon	Big Horn River	.69	34	57	94	2,075.00	155.70	1919
15398	4	W. C. Chall	South Beaver Creek	.48	18	35	113	100.00	38.00	1920
15399	4	Ed. Karel	Wisdom Wash	1.378	20	22	110	270.00	105.00	1922
15400	4	Liberty Potash Company	Green River	.68	26	18	107	6,500.00		1920
15401	4	Ed. Karel	Towey Wash	.89	21	22	110	175.00	30.00	1922
15402	1	Ward Barber, et al.	Libby Creek	.50	29	16	78	100.00		1921
15403	1	A. N. McManis, et al.	Sage Creek	.75	2	18	86	300.00	507.90	1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15404	3	E. D. Edwards, et al.	Big Popo Agie River	.69	17	32	100	50,000.00	Electricity	1920
15405	4	Callie W. Hickey	Sage Creek	.806	20	13	114	45.00	55.00	1920
15406	4	L. E. Harris	Six Mile Creek	1.413	25	15	116	110.00	112.55	1920
15407	1	Dora B. Robinson	Corrall Creek	.525	26	25	72	25.00	15.10	1920
15408	3	Prosper LaRose	Gwynn Spring No. 1		34	45	99	25.00		1921
15409	3	Prosper LaRose	Gwynn Spring No. 2		35	45	99	25.00		1921
15410	3	W. K. Maret	Maret Spring No. 1		4	44	100	25.00		1921
15411	3	W. K. Maret	Maret Spring No. 2		3	44	100	25.00		1921
15412	1	C. I. Betzer	North Platte River	.80	18	31	70	210.00	129.80	1921
15413	3	Carl Lovestedt	Alkali Spring No. 4		4	42	92	50.00		1921
15414	3	Carl Lovestedt	Alkali Spring No. 1		3	42	92	50.00		1921
15415	3	Carl Lovestedt	Alkali Spring No. 2		3	42	92	50.00		1921
15416	3	Carl Lovestedt	Alkali Spring No. 3		4	42	92	50.00		1921
15417	1	Susannah Angwin	Seepage Springs	.10	18	22	81	500.00	5.00	1922
15418	1	I. J. Rendle, et al.	Spring	24.00	3	23	88	60,000.00	Power	1922
15419	1	Arthur Gaylord, et al.	N. Br. Middle Casper Creek	2.12	1	34	86	850.00	399.00	1922
15420	1	Arthur Gaylord	Middle Casper Creek	1.790	13	34	86	625.00	191.00	1922
15421	2	A. F. Erickson	Fields Run	1.67	3	43	66	300.00	200.00	1921
15422	4	James Lee	Gilbert Creek	.959	32	13	115	70.00	73.60	1920
15423	4	Lee Smith	Hoback River	1.452	21	36	114	1,000.00	142.00	1920
15424	1	Mrs. Violet Held	Unnamed Draw	1.10	6	26	71	100.00	20.00	1921
15425	2	F. J. Williams	Spring Draw	.30	32	57	86	50.00	3.71	1920
15426	2	S. C. Hawthorne	Crazy Woman Creek	2.00	20	49	80	500.00	79.00	1921
15427	3	Mrs. Ellen Robertson	Halls Gulch	.852	24	32	100	100.00	12.50	1920
15428	3	Caroline Fuller	W. Dry Creek	.605	24	40	93	175.00	12.00	1921
15429	4	W. D. Alley	Rabbit Creek	1.172	21	22	120	700.00	218.00	1920
15430	1	Kent Snyder	Snyder Spring No. 1	.045	36	23	68	375.00		1921
15431	1	Kent Snyder	Snyder Spring No. 2	.04	36	23	68	30.00		1921
15432	1	Kent Snyder	Snyder Spring No. 3	.06	36	23	68	100.00		1921
15433	1	Producers & Refiners Corporation	Baer Spring	3.14	24	32	95	1,500.00		1920
15434	1	Producers & Refiners Corporation	O'Brien Spring	2.91	26	32	95	1,300.00		1920
15435	1	Producers & Refiners Corporation	Spring	3.14	23	32	95	50.00		1920
15436	1	Geo. Sullivan	Cow Creek	1.75	2	15	84	350.00	78.00	1922
15437	1	Larsen Bros.	McPhail Draw	.33	8	17	84	100.00	S. Supply	1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15438	2	E. R. Maris	Stockade Beaver Creek	.875	29	47	60	150.00	68.42	1921
15439	2	E. R. Maris	Stockade Beaver Creek	.50	4	46	60	100 00	19.24	1921
15440	2	W. B. Brock	Soldier Creek	1.00	7	44	78	150 00	28.00	1921
15441	2	C. C. Ripley	S. Fk. Redwater Creek	1.789	17	53	61	750.00	225 00	1920
15442	2	A. S. Russell	Prairie Dog Creek	1.00	8	55	83	200.00	S. Supply	1920
15443	3	G. B. Fuller	West Dry Creek	.95	26	40	93	250.00	41.00	1921
15444	3	P. H. Shallenberger	Cottonwood Creek	1.667	24	40	90	275.00	51.00	1921
15445	3	United States of America	Sage Creek	14.00	17	57	97	35,000.00	S. Supply	1920
15446	3	E. W. Starr	Flood Gulch	.25	27	37	87	50.00	10 00	1922
15447	2	J. T. Farrell, et al.	Benton Creek	.403	30	51	63	100.00	16 00	1920
15448	2	J. T. Farrell, et al.	W. Fk. Benton Creek	.719	30	51	63	150.00	48.00	1920
15449	1	H. S. Coates	Spring	1.00	35	33	80	200 00	38.40	1920
15450	1	Nestor Nurmi	Long Creek	.25	17	26	84	25.00	5.00	1920
15451	1	Nestor Nurmi	Long Creek	.50	17	26	84	50 00	107.00	1920
15452	1	John Twominen	Long Creek	1.525	17	26	84	150 00	46 00	1921
15453	1	John Twominen	Long Creek	.65	17	26	84	75 00	16.5	1921
15454	1	John Twominen	Long Creek	.35	17	26	84	100 00	28.00	1921
15455	1	John Twominen	Long Creek	.30	9	26	84	50.00	8.00	1921
15456	2	Wenonah E. Andrews	W. S. Draw	.50	3	54	85	117.00	15.00	1921
15457	2	Wenonah E. Andrews	Alder Gulch	.65	33	55	85	150 00	52 00	1921
15458	2	Wenonah E. Andrews	Alder Gulch	.435	34	55	85	100.00	S. Supply	1921
15459	3	J. E. Earley	Canyon Creek	1.10	21	44	87	800.00	13.50	1921
15460	3	Seth Durfee	Springs	4.043	6	56	93	500.00	70.00	1920
15461	3	Seth Durfee	Springs		1	56	93	25.00	S. Supply	1920
15462	3	Seth Durfee	Springs		36	57	94	25.00	S. Supply	1920
15463	3	Thomas Foley	Foley Springs	.44	29	50	100	100.00	7.00	1921
15464	4	John Novotny	Spring Creek	.612	30	35	113	200.00	141.00	1919
15465	4	C. P. Budd	Spring Creek	3.321	16	33	113	100.00	S. Supply	1921
15466	1	Alva C. Rice	Shawnee Creek	.63	17	31	69	300.00	17.00	1921
15467	1	Alva C. Rice	Shawnee Creek	.14	17	31	69	250.00	26.00	1921
15468	1	Robert Rainey	Dutton Creek	2.986	9	19	76	1,000 00	268.20	1921
15469	1	Robert Rainey	Dutton Creek	.745	15	19	76	300.00		1921
15470	1	J. J. Corbett	Sage Creek	.90	33	33	79	200.00	36.50	1921
15471	1	Producers & Refiners Corp.	Connor Spring No. 1	3.17	6	32	94	1,400.00	Power	1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15472	1	Producers & Refiners Corp.	Connor Spring No. 2	3.19	6	32	94	1,450.00	Power	1920
15473	1	Producers & Refiners Corp.	Dan Spring	.34	7	32	94	200.00	Power	1920
15474	2	Heirs of Mary C. Marquiss	Hay Creek	.69	9	44	72	100.00	25.00	1920
15475	2	Bertha S. Talbot	Spring		30	51	63	20.00		1920
15476	2	Bertha S. Talbot	W. Fk. Benton Creek		25	51	64	20.00		1920
15477	2	Bertha S. Talbot	Spring		30	51	63	10.00		1920
15478	2	B. A. Carpenter	Bilderback Draw	.50	9	49	80	75.00	14.00	1921
15479	2	Clara M. Lester	Lester Draw	4.27	21	38	85	2,300.00	75.80	1921
15480	2	W. A. Sutterfield	Cottonwood Creek	.75	19	38	84	400.00	30.20	1921
15481	4	Martin Wilson, et al.	Hams Fork Creek	4.329	20	20	112	500.00	79.40	1920
15482	1	I. S. Bartlett	Hartville Gulch	.25	12	27	66	100.00	1.00	1920
15483	2	Byron Croy	Little Powder River	.28	25	58	71	200.00	27.40	1921
15484	2	Byron Croy	Little Powder River	.20	24	58	71	120.00	13.50	1921
15485	4	L. E. Chesney, et al.	Thomas Canyon	1.415	11	15	121	100.00	87.00	1922
15486	3	Ruth Wilkinson	Spring	3.08	33	58	102	50.00	S. Supply	1920
15487	2	Ellsworth Baker	Stockade Beaver Creek	2.25	13	43	61	500.00	101.00	1921
15488	1	Herbert King, et al.	Rock Creek	9.895	19	19	78	14,000.00		1921
15489	1	Herbert King, et al.	One Mile Creek	8.655	20	19	78		S. Supply	1921
15490	1	Herbert King, et al.	Rock Creek	6.26	23	19	77	1,200.00	S. Supply	1921
15491	3	Asmus Boysen	Popo Agie River	5.114	28	32	101	100.00	Power	1923
15492	1	Belle Bennett	Bennett Creek	.60	35	33	81	100.00	60.00	1920
15493	1	Henry Slack	Meadow Gulch	.341	26	27	84	100.00	29.50	1921
15494	1	Christina McPherson	McPherson Draw	1.00	32	36	79	250.00	60.00	1920
15495	1	Mike Lynch	Spring Creek	.385	1	16	71	150.00	7.50	1921
15496	1	Mike Lynch	Spring Creek	.60	1	16	71	350.00	16.80	1921
15497	3	Robert Houston	Mud Creek	1.20	1	42	91	300.00	S. Supply	1920
15498	1	Mrs. Anna Sanford	Dogie Creek	.955	4	31	74	100.00	18.20	1920
15499	2	Lonnabaugh-Nelson Co.	Apple Run	.60	4	54	85	175.00	S. Supply	1920
15500	4	Ellen E. Sommers	Flat Creek	.60	4	41	115	150.00	17.00	1921
15501	4	Ellen E. Sommers, et al.	Flat Creek	1.25	34	42	115	300.00	95.00	1921
15502	3	Carl Lovestedt	Alkali Spring		3	42	92	25.00	Oil	1920
15503	3	Viva Hoffman	N. Fk. Owl Creek	.54	34	44	101	100.00	21.00	1921
15504	2	Johnson Morgareidge, et al.	Prairie Dog Creek	1.00	15	57	83	600.00	S. Supply	1920
15505	1	Horne Bros., Inc.	Medicine Bow River	1.615	10	20	79	600.00	12.60	1922

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15506	1	Mary Kortes	Lost Creek	1.437	25	26	84	200 00	21.00	1921
15507	1	James Atkinson	Pinto Creek	.75	16	24	73	100.00	24 00	1920
15508	1	James Atkinson	Spring Creek	.60	29	24	72	75.00	34 00	1920
15509	1	James Atkinson	Spring Creek	.40	29	24	72	50 00	11.00	1920
15510	3	D. Lodder	Eagle Spring No. 1		14	44	100	20.00	Oil Placer	1920
15511	3	D. Lodder	Eagle Spring No. 2		14	44	100	20.00	Oil Placer	1920
15512	1	Richards Bros.	Snowy Zone Creek	.161	7	26	81	50.00		1920
15513	1	Richards Bros.	Snowy Zone Draw	.473	6	26	81	100.00		1920
15514	1	Richards Bros.	Snowy Zone Draw	.55	31	27	81	100.00		1920
15515	1	J. J. Wombaker	Cotton Creek	.75	20	14	83	150.00	24.00	1921
15516	2	Lewis Pike	Indian Spring Gulch	1.08	7	38	84	550 00	82.00	1924
15517	2	A. W. Long	Flying E Draw	.35	21	53	82	70 00	9.00	1920
15518	2	R. D. McLean, et al.	Freeze Out Creek	5.50	11	56	88		S. Supply	1920
15519	3	W. W. Crisman	Swale	.65	4	56	96	50.00	S. Supply	1920
15520	4	Geo. A. Wilson	Little Horse Creek	.30	18	39	115	60 00	15.00	1921
15521	4	Geo. A. Wilson	Big Horse Creek	.87	18	39	115	100 00	40.00	1921
15522	4	Geo. A. Wilson	Big Horse Creek	.87	6	39	115	150.00	18.00	1921
15523	4	Frank Kosic	Canon Creek	1.011	16	12	102	300.00	27.00	1922
15524	4	Frank Kosic	Canon Creek	1.057	16	12	102	300.00	18.00	1922
15525	4	Frank Kosic	Canon Creek	.511	23	12	102	150 00	7.00	1922
15526	4	Frank Kosic	Canon Creek	.475	23	12	102	150.00	5.00	1922
15527	4	Frank Kosic	Spring	.501	24	12	102	150 00	33 50	1922
15528	4	B. C. Fox	Spring Creek	1.909	2	26	114	1,200.00	99.00	1921
15529	4	G. G. Bentley	Horse Creek	1.12	5	34	113	900.00	250.00	1922
15530	1	A. G. Sims	Wagon Hound Creek	.92	11	29	74	100.00	46.00	1921
15531	3	Gilbert Muir	Spring Gulch	.87	15	42	105	125.00	21.00	1921
15532	3	David Alder	Alder Spring No. 1		31	43	101	50.00		1920
15533	3	David Alder	Alder Spring No. 2		31	43	101	50.00		1921
15534	3	Wm. Nation	Nation Spring		27	43	101	50.00		1920
15535	3	C. C. Moore	Moore Spring No. 1		9	41	93	25.00		1920
15536	3	C. C. Moore	Moore Spring No. 2		15	41	93	50.00		1920
15537	3	C. C. Moore	Moore Spring No. 3		15	41	93	80.00		1920
15538	3	C. C. Moore	Moore Spring No. 4		15	41	93	50.00		1920
15539	3	Mike McCarthy	McCarthy Spring		30	42	90	75.00		1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15540	3	Mrs. Lucy L. Moore	Morrison Spring	.48	3	5 N.	5 E.	400.00	S. Supply	1921
15541	3	Lucy L. Moore	Spring	.41	10	5 N.	5 E.	200.00	17.00	1921
15542	3	Lucy L. Moore	Spring	1.742	34	6 N.	5 E.	3,800.00	S. Supply	1922
15543	3	Lucy L. Moore	Spring	.08	3	5 N.	5 E.	275.00	S. Supply	1922
15544	3	James Nolan	Spring	.11	30	48	100	150.00	....	1921
15545	3	W. G. Knollenberg	Meadow Creek	1.06	35	8 N.	5 W.	300.00	S. Supply	1921
15546	4	T. E. Ickes	Blacks Fork River	6.672	17	19	110	1,800.00	317.50	1922
15547	4	Jessie G. Hawkins	Dog Creek	2.50	6	38	116	2,000.00	145.00	1923
15548	4	Martin B. Tyler	Spring Creek	2.439	19	36	110	800.00	112.00	1921
15549	1	Mabel E. Harris	Crooks Creek	.436	31	28	92	225.00	S. Supply	1921
15550	1	W. J. Bradley	Springs	.09	1	13	72	20.00	1.50	1921
15551	1	Robert R. Mann	Sweetwater River	.852	28	28	100	500.00	20.80	1921
15552	1	A. G. Sims	Jackson Creek	1.25	10	29	74	1.00	S. Supply	1921
15553	1	A. G. Sims	Spring Gulch	1.25	10	29	74	200.00	81.00	1921
15554	1	Walter Morgan	Nigger Creek	.40	8	13	89	150.00	53.00	1920
15555	1	Martin Carter	North Horseshoe Creek	.851	30	29	70	250.00	25.30	1920
15556	2	Charles Parker	Draw	.50	32	55	84	100.00	S. Supply	1923
15557	2	Malcolm Moncreiffe	South Coyote Draw	.45	24	54	85	100.00	S. Supply	1920
15558	2	Malcolm Moncreiffe	North Coyote Draw	.16	13	54	85	....	S. Supply	1920
15559	2	Chas. O. Lucas	Lone Star Draw	.30	18	54	84	50.00	S. Supply	1920
15560	2	Wenonah E. Andrews	Draw	.50	34	55	85	100.00	S. Supply	1920
15561	3	J. F. White, et al.	Seepage Gulch	.50	24	1 N.	4 E.	100.00	S. Supply	1920
15562	3	G. H. Wiederien	Dry Gulch	.93	9	7 N.	1 W.	500.00	Supply	1922
15563	3	Alfred Dalzelle	Dalzelle Spring No. 1	.04	18	42	93	75.00	....	1920
15564	3	Alfred Dalzelle	Dalzelle Spring No. 2	.04	17	42	93	75.00	....	1920
15565	1	H. D. Hackmaster	Roaring Fk. Little Snake River	2.18	17	12	86	1,500.00	77.50	1920
15566	2	Della M. Sims	Twenty Mile Creek	.15	22	35	67	150.00	24.20	1921
15567	3	P. W. Drummond	Drummond Spring No. 1	.36	32	44	100	600.00	....	1921
15568	3	P. W. Drummond	Drummond Spring No. 2	....	32	44	100	50.00	....	1921
15569	4	Joseph Markham, et al.	Emma Matilda Creek	3.28	14	45	114	1,600.00	386.51	1922
15570	1	J. T. Kirk	Crooks Creek	1.00	7	28	92	2,000.00	85.00	1922
15571	1	John T. Kirk	Crooks Creek	.50	7	28	92	500.00	12.00	1922
15572	1	Charlotte M. Bell	Middle Casper Creek	.125	3	32	87	50.00	S. Supply	1922
15573	1	Charlotte M. Bell	South Rohebaugh Creek	.55	35	33	87	600.00	37.00	1922

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15574	1	**John E. McNees**	**Saylor Creek**	1.50	34	25	83	700.00	72.00	1921
15575	1	W. H. Wolfard	E. Fk. Dillon Gulch	.40	1	14	84	100.00	12.50	1921
15576	1	W. H. Wolfard	W. Fk. Dillon Gulch	.20	2	14	84	100.00	S. Supply	1921
15577	1	W. H. Wolfard	Badger Gulch	.20	1	14	84	100.00	S. Supply	1921
15578	1	Smiley Sheep Co.	Smiley Spring	1.50	14	21	88	4,000.00		1922
15579	1	**Florence L. Kirk**	Wood Gulch	.35	10	28	93	250.00		1922
15580	1	**Florence L. Kirk**	O'Brien Creek	.35	3	28	93	250.00		1922
15581	1	**Florence L. Kirk**	Dry Wash	.50	31	29	92	525.00		1922
15582	1	Florence L. Kirk	Dry Wash	.90	28	29	92	1,000.00	228.00	1922
15583	2	A. M. Brock	Powder River	4.50	24	43	79	8,000.00	543.00	1921
15584	2	Fred Miley	Powder River	.40	9	50	77	90.00	66.40	1921
15585	3	M. E. Mills	Big Wind River	.71	25	42	108	350.00	57.00	1921
15586	3	L. F. Thornton	Tile Drain	1.25	4	43	96	100.00	S. Supply	1921
15587	4	A. W. Smith L. S. Co.	Spring Creek	1.75	1	30	113	500.00	S. Supply	1922
15588	4	Minnie Holmes	Big Sandy River	2.182	17	27	106	1,200.00	78.00	1923
15589	4	Mark E. Rathbun	North Piney Creek	1.66	30	31	114	900.00	97.00	1921
15590	4	Mae Whitman	Spring Creek	2.752	31	37	110	1,200.00	113.00	1921
15591	4	R. H. Anderson	Kinney Spring	.35	8	15	98	200.00	28.00	1921
15592	1	W. H. McPherson	Riddle Creek	.60	17	25	86	300.00	30.00	1922
15593	2	Wilbert Goodson	Cow Creek	3.127	2	52	63	500.00	204.50	1920
15594	3	M. Cowan	Big Horn River	.034	29	44	94	200.00	4.70	1921
15595	3	Robert Moore	Moore Spring		15	41	94	50.00		1920
15596	1	A. C. McLaughlin	Sulphur Creek	2.957	10	27	97	10,000.00		1924
15597	2	Ralph Denio	**E. Fk. Little Tongue River**	.464	30	56	86	1,600.00	446.00	1920
15598	3	Geo. Call, et al.	**Draw**	.25	35	53	92	100.00	S. Supply	1921
15599	3	Geo. Call, et al.	**Draw**	.10	35	53	92	50.00	S. Supply	1921
15600	3	Wm. H. Abshire	**Clarks Fork River**	3.30	8	56	103	10,000.00	723.00	1923
15601	3	State of Wyoming	Spring		34	54	102	300.00		1921
15602	4	John McCuaig	Yellow Creek	.57	25	15	121	25.00	35.00	1921
15603	4	Ed. Durtschi	Spring Creek	.08	5	43	118	40.00	13.40	1920
15604	4	Edward Durtschi	Spring Creek	.03	5	43	118	25.00	1.60	1920
15605	4	Edward Durtschi	Spring Creek	.65	4	43	118	75.00	26.10	1920
15606	4	R. E. Clark, et al.	New Springs	1.214	5	34	110	400.00	90.00	1921
15607	1	**Midwest Refining Co.**	North Platte River	.28	7	33	79	85,000.00		1920

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15608	1	Midwest Refining Co.	North Platte River	.28	7	33	79	15,000.00		1920
15609	1	I. S. Wilson	Wilson Spring	.31	5	32	72	600.00	.25	1921
15610	2	Emma Bayer	Bayer Draw	1.33	26	38	81	600.00	101.90	1920
15611	1	General Petroleum Corporation	Gap Spring	1.50	20	25	86	2,000.00		1920
15612	1	General Petroleum Corporation	Rattlesnake Springs	3.91	2	25	86	4,000.00		1920
15613	1	General Petroleum Corporation	Antelope Springs	2.83	4	25	86	2,600.00		1920
15614	1	C. D. Carey	Draw	.932	35	23	67	50.00	27.59	1920
15615	2	Oscar Carlson	Alum Creek	.521	27	55	62	160.00	13.30	1920
15616	3	J. S. Harris, et al.	N. Fk. Popo Agie River	3.246	35	34	100	1,300.00	182.00	1922
15617	3	E. B. Short	Short Spring No. 1		30	43	100	50.00		1920
15618	3	E. B. Short	Short Spring No. 2		25	43	101	50.00		1920
15619	3	E. B. Short	Short Spring No. 3		36	43	101	50.00		1920
15620	4	J. H. Bailey	Lava Creek	.67	29	45	113	100.00	168.00	1922
15621	4	La Barge Land & L. S. Co.	Delaney Spring Creek	.691	33	26	112	400.00	65.00	1921
15622	1	C. C. Lusby	North Platte River	.25	9	30	82	2,000.00	56.00	1921
15623	1	F. H. Healey	S. Fk. Grand Encampment R.	16.00	13	14	84	20,000.00	3,949.74	1924
15624	1	C. W. Linde	Eastman Creek	2.471	28	13	88	425.00	S. Supply	1921
15625	1	C. W. Linde	Miller Creek	.50	29	13	88	100.00	S. Supply	1921
15626	1	J. M. Rumsey, et al.	Hot Spring No. 1	.09	12	17	84	500.00		1922
15627	1	J. M. Rumsey, et al.	Hot Spring No. 2		12	17	84	1,000.00		1922
15628	1	J. M. Rumsey, et al.	Hot Spring No. 3		12	17	84			1922
15629	1	J. M. Rumsey, et al.	Hot Spring No. 4	.02	13	17	84	2,000.00		1922
15630	1	J. M. Rumsey, et al.	Hot Spring No. 5		13	17	84	1,000.00		1922
15631	1	J. M. Rumsey, et al.	Hot Spring No. 6		13	17	84			1922
15632	2	R. B. Marquiss	School Creek	.25	8	44	73	50.00	11.80	1920
15633	3	R. B. Marquiss	Belle Fourche River	.333	8	44	73	50.00	13.00	1920
15634	2	R. B. Marquiss	Belle Fourche River	.125	8	44	73	20.00	10.00	1920
15635	2	Geo. Sonnamaker	Sonnamaker Creek	.59	17	53	83	100.00	40.00	1921
15636	2	Grace M. McFerren	S. Fk. Powder River	.65	26	43	81	700.00	28.80	1922
15637	4	James Vogel	Windy Spring	.08	17	41	116	30.00		1920
15638	1	John Jussila	Beaver Creek	1.00	27	26	82	300.00	65.00	1922
15639	1	John Jussila	Sage Creek	.20	27	26	82	100.00	5.00	1920
15640	2	J. B. Huggins	Huggins Creek	1.27	32	52	82	200.00	24.30	1922
15641	3	Chase Lawrence, et al.	Fenton Draw	.45	24	54	92	100.00		1922

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15642	3	Chase Lawrence, et al.	Davis Draw	.20	24	54	92	100.00		1922
15643	3	H. D. Curtis	Cottonwood Creek	2.81	10	44	98	3,000.00		1920
15644	1	J. J. Johnson	E. Fk. Cottonwood Creek	2.00	11	28	91	1,500.00	S. Supply	1922
15645	1	J. J. Johnson	W. Fk. Cottonwood Creek	.50	4	28	91	200.00	15.60	1922
15646	1	S. L. Jenkins	French Creek	.60	5	14	81	100.00	24.00	1921
15647	1	S. L. Jenkins	Little Creek	.30	5	14	81	100.00	14.00	1921
15648	3	Simon Snyder	Spring Creek	1.00	9	48	106	200.00	40.00	1920
15649	3	Simon Snyder	Spring Creek	1.00	9	48	100	175.00	40.00	1920
15650	3	Cloyd Miller	Dry Creek	2.31	11	4 N.	5 W.	800.00	153.00	1921
15651	3	Daniel Root	Root Spring	1.17	21	40	89	225.00	35.00	1922
15652	3	James Brightop	Flood Gulch	.03	17	6 N.	4 W.	50.00	S. Supply	1921
15653	4	A. B. Snowball	Spring	.50	31	15	120	50.00	S. Supply	1921
15654	3	Max Wilde	Spring	.40	9	48	106	25.00	5.00	1920
15655	1	F. W. Sipple, et al.	Corral Creek	2.610	21	31	80	1,000.00	65.50	1922
15656	1	Andrew Johnson	Deep Creek	2.60	9	14	87	1,500.00		1922
15657	2	E. P. Willson	W. Br. Harney Creek	1.293	34	34	67	250.00	S. Supply	1922
15658	2	Chas. Bugher	Powder River	.33	28	50	77	150.00	19.50	1921
15659	3	Lucie E. Thurston	Long Hollow Creek	.22	14	49	100	200.00	S. Supply	1921
15660	3	C. V. Linck	Spring Gulch	.42	16	6 N.	4 W.	200.00	81.00	1921
15661	1	Douglas Reservoirs Co.	Dorr Draw	2.40	27	32	72	700.00	S. Supply	1920
15662	1	Douglas Reservoirs Co.	Dorr Draw	1.30	27	32	72	175.00	S. Supply	1920
15663	1	Douglas Reservoirs Co.	Bed Tick Creek	.80	31	32	71	100.00	S. Supply	1920
15664	1	Douglas Reservoirs Co.	Little Bed Tick Creek	.60	25	32	72	75.00	S. Supply	1920
15665	1	Douglas Reservoirs Co.	Five Mile Creek	.46	5	32	72	100.00	S. Supply	1920
15666	1	Douglas Reservoirs Co.	Five Mile Creek	.30	33	33	72	100.00	S. Supply	1920
15667	1	Douglas Reservoirs Co.	South Five Mile Creek	.61	8	32	72	440.00	S. Supply	1920
15668	1	Douglas Reservoirs Co.	South Five Mile Creek	.40	4	32	72	80.00	S. Supply	1920
15669	1	Douglas Reservoirs Co.	Six Mile Draw	.36	9	32	72	75.00	S. Supply	1920
15670	1	Douglas Reservoirs Co.	Six Mile Draw	.48	10	32	72	100.00	S. Supply	1920
15671	1	Douglas Reservoirs Co.	Clark Draw	.82	3	32	72	120.00	S. Supply	1920
15672	1	Douglas Reservoirs Co.	Erwin Draw	1.10	18	32	71	150.00	S. Supply	1920
15673	1	Douglas Reservoirs Co.	Bed Tick Creek	1.20	32	32	71	150.00	S. Supply	1920
15674	1	Thomas H. Rudd	Rudd Spring	.54	17	32	72	250.00		1921
15675	2	Union Oil Co.	Bills Creek	1.00	30	35	65	2,200.00		1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15676	2	Northern Wyo. Land Co.	Cemetery Creek	1.15	35	51	82	300.00	35.68	1921
15677	3	Wm. Blackburn	Bitter Creek	.27	7	55	97	100.00	S. Supply	1921
15678	3	P. W. Drummond	Spring Gulch	.62	29	44	100	300.00	18.50	1922
15679	4	John Lavelle	Kinney Creek	.80	8	15	99	200.00	55.00	1922
15680	4	American Asbestos Mining & Milling Co.	Berry Creek					20,000.00	Power	1923
15681	1	J. B. Case	Saylor Creek	.45	30	25	82	200.00	7.60	1922
15682	3	Kathleen N. Bishop	Willow Creek	.34	24	56	94	60.00	20.30	1921
15683	3	Kathleen N. Bishop	Willow Creek	.49	24	56	94	70.00	38.00	1921
15684	4	Mrs. E. A. Baldwin	Meadow Canyon Creek	.78	20	30	111	125.00	S. Supply	1921
15685	4	Wm. Bartek	North Fish Creek	.19	1	23	118	500.00	10.00	1922
15686	4	Wm. Bartek	North Fish Creek	.34	12	23	118	750.00	20.00	1922
15687	4	Wm. Bartek	West Fish Creek	.473	11	23	118	1,000.00	20.00	1922
15688	4	Wm. Bartek	Dry Fish Creek	.19	12	23	118	25.00	S. Supply	1922
15689	4	A. D. Hoskins	Lake Creek	.37	19	28	117	50,000.00		1922
15690	1	Peter Rasmussen	Spring Creek	1.50	10	12	87	400.00	37.50	1921
15691	1	D. S. Richmond	Spring Creek	1.80	26	17	84	300.00	23.50	1923
15692	1	Midwest Refining Co.	Laramie River	.528	29	16	73	60,000.00		1921
15693	1	Carter Oil Company	Elk Creek	3.00	2	28	81	10,000.00	Drilling	1922
15694	1	James Willox	Gooseberry Creek	.95	1	29	73	300.00	70.00	1921
15695	3	Mrs. E. C. Hyatt, et al.	Paint Rock Creek	.84	6	49	89	300.00	30.00	1921
15696	3	Mrs. E. C. Hyatt, et al.	Paint Rock Creek	.95	6	49	89	500.00	36.00	1921
15697	3	John Hays	Dry Creek	1.50	30	5 N.	2 W.	100.00	S. Supply	1922
15698	3	James Croskey, et al.	N. Fk. Owl Creek	4.278	18	43	100	6,000.00	S. Supply	1924
15699	3	James Croskey, et al.	N. Fk. Owl Creek	.66	3	43	100	700.00		1924
15700	3	James Croskey, et al.	N. Fk. Owl Creek	5.273	3	43	100	500.00	S. Supply	1924
15701	3	James Croskey, et al.	N. Fk. Owl Creek	1.476	3	43	100	150.00	S. Supply	1924
15702	3	James Croskey, et al.	N. Fk. Owl Creek	4.065	2	43	100	500.00	S. Supply	1924
15703	3	Henry Peterson, et al.	N. Fk. Popo Agie River	4.563	13	2 S.	1 W.	2,000.00	S. Supply	1922
15704	2	L. F. Steinhilber	Kinney Draw	1.00	17	51	77	500.00	116.00	1922
15705	3	Etta Rule	Gypsum Creek	.82	22	58	96	100.00	71.00	1921
15706	3	Etta Rule	Dry Creek	1.21	23	58	96	400.00	18.00	1921
15707	3	Etta Rule	Dry Creek	.75	24	58	96	400.00	65.60	1921
15708	1	Joseph Wagoner	Low Creek	1.25	31	17	86	200.00	160.00	1922
15709	1	Joseph Wagoner	S. Fk. Low Creek	1.00	6	16	86	300.00	S. Supply	1922

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15710	1	John Norbacher, et al.	Sage Creek	3.60	18	26	82	2,000.00	348.00	1922
15711	4	R. W. Brown, et al.	Spring	.46	17	44	118	150.00	S. Supply	1921
15712	2	Bessie M. Bullis	Burnett Creek	2.358	28	49	82	500.00		1922
15713	3	Gooseberry Farmers Canal Co.	Wood River		31	47	97	1,000.00	S. Supply	1922
15714	2	E. S. Townsend, et al.	Park Creek	1.40	18	55	85	25 00	S. Supply	1921
15715	3	W. F. Unterzuber	Deep Gulch	1.25		52	93	150.00	S. Supply	1921
15716	3	R. O. Hamilton	Little Wind River	6.74	26	1 N.	1 E.	4,000.00	S. Supply	1922
15717	3	J. L. & C. L. Miller	Dinwoodie Creek	4.60	9	5 N.	5 W.	1,500.00	137.00	1922
15718	4	Ada R. Pate	Gooseberry Draw Creek	1.962	3	21	119	300.00	194.70	1923
15719	4	Ada R. Pate	Gooseberry Draw Creek	1.297	34	22	119	400.00	102.40	1922
15720	4	Ada R. Pate	Ada Spring No. 1	.393	26	22	119	50.00	S. Supply	1921
15721	4	Ada R. Pate	Ada Spring No. 2	.229	27	22	119	50.00	S. Supply	1921
15722	4	Ada R. Pate	Ada Spring No. 3	.791	35	22	119	50.00	S. Supply	1921
15723	1	H. J. Bolln	North Platte River	.847	29	33	71	500.00	119.70	1922
15724	1	J. C. Temple	Spring Creek	2.125	15	12	87	250.00	261.00	1923
15725	1	J. C. Temple	Spring Creek	2.125	15	12	87	250.00	129.00	1923
15726	1	J. C. Temple	Spring Creek	1.245	10	12	87	250.00		1923
15727	1	Chas. L. Patchell	Spring	1.00	33	16	73	5,280.00		1921
15728	1	Ed. Royce, et al.	North Platte River	.90	9	30	82	3 000 00	264.50	1923
15729	2	Walker Creek L. S. Co.	Piney Creek	.32	3	35	68	275.00	21.00	1921
15730	2	Walker Creek L. S. Co.	Piney Creek	.53	3	35	68	300.00	47.00	1921
15731	2	Walker Creek L. S. Co.	Walker Creek	.46	3	35	68	280.00	22.00	1921
15732	2	Walker Creek L. S. Co.	Walker Creek	.48	34	36	68	300 00	35.00	1921
15733	3	Simon Skovgard	Dorsey Creek	.75	9	51	94	250.00	25.00	1921
15734	3	S. Skovgard, et al.	Greybull River	9.50	29	48	102	145 000.00	Supply	1924
15735	3	S. Skovgard, et al.	Wood River	1.50	29	47	101	75,000.00		1924
15736	4	C. H. Hurdsman	Brewster Draw	2.706	36	15	116	250.00	140.70	1921
15737	4	J. P. Ranch Co.	Gros Ventre River	4.20	18	42	115	6,000.00	756.74	1923
15738	3	Mangus Peterson	E. Fk. Dry Creek	.55	3	39	92	175.00	25.00	1922
15739	1	Ruby A. Spracklen	Reid Creek	1.24	9	28	72	150.00	17.00	1921
15740	1	H. W. Meglemre	Chugwater Creek	2.00	29	24	67	100 00	132.20	1920
15741	3	W. A. Hinderliter	S. Fk. Owl Creek	1.10	31	9 N.	2 E.	250.00	60.00	1921
15742	3	Mrs. E. M. Nordstrom	Nordstrom Spring		6	43	100	50.00		1921
15743	4	W. M. Henry	Brewster Wash	.65	35	15	116	100.00	154.50	1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15744	4	James Perry	Dugway Spring	.58	9	14	115	50.00	41.00	1921
15745	4	Wyoming Shale & Metals Co.	Ruby Spring	1.00	28	17	107	6,000.00	....	1923
15746	4	Elk Ranch Co.	Black Rock Creek	10.19	31	45	112	50,000.00	S. Supply	1922
15747	4	Elk Ranch Co.	Buffalo Fork Snake River	.40	25	45	113	300.00	S. Supply	1921
15748	3	L. G. Phelps	Rawhide Creek	1.80	23	49	108	1,500.00	....	1922
15749	3	L. G. Phelps	Rawhide Creek	3.10	32	49	102	500.00	770.00	1922
15750	4	Fred Ecklund	W. Fk. New Fork River	1.44	35	33	109	500.00	74.00	1921
15751	4	George Bugas	Brewster Draw	.426	35	15	116	40.00	S. Supply	1921
15752	4	George Bugas	Brewster Draw	.12	35	15	116	20.00	S. Supply	1921
15753	4	George Bugas	Brewster Draw	.05	35	15	116	15.00	S. Supply	1921
15754	4	Susie Bugas	Blacks Fork River	.178	2	14	116	25.00	S. Supply	1921
15755	1	Edith M. Leech	South Elkhorn Creek	.892	13	29	71	100.00	49.90	1921
15756	2	Peter C. Noomen	South Fk. Dry Creek	.85	13	50	81	250.00	57.78	1921
15757	2	Peter Noomen	Dry Creek	.92	12	50	81	250.00	76.66	1921
15758	4	A. H. Holmes	Big Sandy River	2.032	2	26	106	600.00	104.00	1922
15759	1	Selga Jourgensen	Willow Creek	1.62	9	31	83	200.00	57.50	1922
15760	1	Selga Jourgensen	Willow Creek	.25	9	31	83	50.00	S. Supply	1922
15761	4	Rose Z. Twichel, et al.	LaBarge Creek	5.80	....	26	113	5,000.00	420.00	1922
15762	3	Vaughn Ranch Company	Willow Creek	1.42	15	32	99	325.00	45.00	1922
15763	4	Claude L. Johnson	W. Fk. Smiths Fork Creek	1.151	35	13	116	100.00	52.00	1922
15764	4	Claude L. Johnson	W. Fk. Smiths Fork Creek	1.039	3	12	116	60.00	112.00	1921
15765	4	Claude L. Johnson	W. Fk. Smiths Fork Creek	.176	26	13	116	20.00	36.00	1921
15766	3	Ralph H. Cochrane	Coal Gulch Creek	2.263	4	32	99	500.00	13.00	1922
15767	3	Ralph H. Cochrane	Coal Gulch Creek	.568	35	33	99	75.00	5.00	1922
15768	3	George F. Baker	Baker Gulch	.25	5	55	103	100.00	....	1921
15769	3	John C. Prante	Skull Creek	.80	18	54	102	250.00	23.00	1922
15770	4	John Ostrom	Spring	.081	36	14	116	30.00	5.00	1921
15771	4	John Ostrom	Spring	.178	36	14	116	70.00	9.50	1921
15772	4	Chesney Stock Farm, Inc.	Thomas Canyon Bear Creek	1.118	11	15	121	300.00	S. Supply	1923
15773	1	R. Z. McCoy	North Spring Creek	6.00	20	16	85	900.00	49.00	1923
15774	1	R. Z. McCoy	Snow Creek	1.00	23	16	85	100.00	S. Supply	1923
15775	1	R. Z. McCoy	Centennial Creek	2.50	36	16	85	200.00	S. Supply	1923
15776	1	R. Z. McCoy	North Spring Creek	4.00	13	16	85	400.00	537.00	1923
15777	2	Edward Gillette	Swaim Draw	.30	15	55	84	50.00	S. Supply	1921

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15778	2	Edward Gillette	Jeffries Draw	.40	15	55	84	100.00	6.00	1921
15779	2	L. Z. Leiter Estate	Piney Creek	3.25	26	53	83	140 600.00		1924
15780	4	Amelia Salmon	Green River	1.66	16	26	112	2,600.00	128.76	1923
15781	3	L. C. Thomsen	Chipmunk Gulch	.37	2	50	101	500.00	Supply	1922
15782	3	L. C. Thompson	Long Hollow	.58	36	51	101	150.00	26.00	1922
15783	3	L. C. Thompson	Coal Mine Gulch	.45	34	51	101	600.00	Supply	1922
15784	3	W. H. Maxwell	Spring Gulch	.94	3	40	91	150.00	16.00	1922
15785	3	James L. Nichols	Spring	.42	29	41	91	250.00	12.00	1922
15786	4	M. H. Kneedy & Son	Gros Ventre River		10	42	115	3,000.00	Power	1922
15787	1	Chas. Ellie	Cottonwood Creek	.50	15	24	80	180.00	44.60	1923
15788	2	Matt Perino	Perino Spring No. 1	.59	23	47	62	400.00		1921
15789	2	Matt Perino	Perino Spring No. 3	.33	23	47	62	150.00		1921
15790	1	Glendo Cattle Company	Cottonwood Creek	1.25	31	30	67	300 00	107.31	1921
15791	1	Glendo Cattle Company	Cottonwood Creek	.45	31	30	67	200.00	S. Supply	1922
15792	4	Ward P. Ball	East Fork River	3.00	18	32	107	5,000.00	133.00	1923
15793	1	Blake Sheep Company	Little Jack Creek	.20	33	17	87	100.00		1922
15794	1	Blake Sheep Company	Little Jack Creek	.75	4	16	87	200.00	51.00	1922
15795	3	Ed. Merriam	71 Spring	.454	20	36	90	275.00	13.00	1921
15796	1	True W. Poage	Cherry Creek	2.86	5	24	64	4 000.00	437.00	1921
15797	4	Patrick W. Conwell	Horse Creek	1.111	2	33	111	600.00	71.00	1922
15798	1	J. Ross Carpenter	Dry Creek	.18	19	14	66	50.00	4.50	1922
15799	1	J. Ross Carpenter	Dry Creek	.057	19	14	66	200.00	S. Supply	1922
15800	1	J. Ross Carpenter	Dry Creek	.132	19	14	66	300.00	18.60	1922
15801	3	Richard V. Dennison	Spring Branch of Bear Creek	.66	32	43	105	200.00	48.00	1922
15802	3	Richard V. Dennison	Spring Branch Bear Creek	.06	32	43	105	100.00		1922
15803	3	Katherine A. T. Duncan	Alkali Creek		14	43	105	10.00	S. Supply	1922
15804	3	Katherine A. T. Duncan	Alkali Creek		14	43	105	10.00	S. Supply	1922
15805	3	Katherine A. T. Duncan	Alkali Creek	.85	26	43	105	200.00	82.00	1922
15806	1	Mrs. James W. Walsh	Hay Slough	.50	36	25	81	150.00	18.90	1923
15807	2	Elizabeth Richter	N. Fk. Crazy Woman Creek	1.17	27	49	83	600.00	S. Supply	1921
15808	3	Harry F. Mallon	Prospect Creek	1.10	13	45	99	800.00	76.00	1923
15809	3	Moneta Townsite Company	Springs	1.039	25	37	91	8,500.00		1923
15810	3	G. A. Kneisly	Spring		17	55	103	50.00		1921
15811	3	J. H. Corcoran	Meeyero Creek	1.25	14	45	96	500.00	110.50	1922

PERMITS TO APPROPRIATE WATER—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
15812	3	Willis Rema	Bear Creek	.92	5	42	105	150.00	34.00	1922
15813	1	Ambrose M. House	Bull Springs Draw	.51	32	25	89	250.00	S. Supply	1922
15814	1	Frank Walker	Bates Hole Draw	.50	15	26	78	150.00	44.20	1923
15815	1	Roy J. Cardwell	Dry Gulch	.625	8	28	83	75.00	24.00	1922
15816	1	G. M. Hiatt	Sybille Creek	1.249	2	24	69	250.00	128.60	1921
15817	4	P. W. Hood	Spring	.64	21	23	116	500.00	67.90	1922
15818	4	P. W. Hood	Spring	.64	21	23	116	500.00	S. Supply	1922
15819	1	Benjamin F. Ewing	Poison Spring Creek	.80	20	32	81	300.60	20.00	1923
15820	1	Benjamin F. Ewing	Poison Spring Creek	.80	20	32	81	200.00	S. Supply	1923
15821	1	Amelia Lee	Poison Spring Creek	1.25	13	32	82	1,200.00	132.50	1922
15822	1	John Mahoney	Cress Creek	1.07	14	26	88	700.00	33.00	1923
15823	1	T. A. Ready, et al.	Muddy Creek	5.47	10	26	88	4,000.00	436.00	1923
15824	3	M. E. Comstock	N. Fk. Owl Creek	.25	33	44	101	100.00	27.60	1921
15825	1	Carol E. Annis, et al.	Arkansas Creek	1.80	27	29	85	500.00	100.00	1923
15826	3	H. D. Curtis	Cottonwood Creek	2.06	10	44	98	5,000.00	....	1921
15827	3	Earl D. Sprague	Bader Gulch	.77	24	47	86	300.00	....	1922
15828	3	John B. Goff, et al.	Natural Lake	1.46	26	54	103	5,000.00	57.00	1922

Applications for Enlargement During the Two Years Ending September 30, 1920

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
3944	2	J. J. Klodt	Mush Creek		26	44	63	200.00	45.00	1921
3945	3	W. B. Schlenker, et al.	Grey Bull River	4.15	21	51	98	500.00	156.60	1920
3946	1	L. R. Kingman	South Spring Creek		25	16	85	200.00	50.00	1920
3947	3	August Anderson	Big Horn River		9	3 N.	6 E.	25.00	35.00	1920
3948	4	A. A. Green, et al.	Smiths Fork River	1.273	29	13	115	450.00	465.00	1920
3950	1	Little Horse Creek Cattle Co.	Little Horse Creek	1.82	17	18	62	200.00	203.10	1920
3951	4	LeRoy Wilcox	Horse Creek		4	34	113	600.00	400.00	1919
3952	1	A. C. Michie	North Platte River	2.10	31	34	77	5,000.00	48.60	1920
3953	2	Ralph Donaldson	N. Fk. Powder River		8	45	83	300.00	29.57	1920
3954	4	R. B. Parker	Beaver Creek	1.39	19	29	113	450.00	103.00	1921
3955	1	W. C. Ledbetter	Indian Creek		22	14	83	50.00	S. Supply	1920
3956	1	W. C. Ledbetter	Indian Creek		22	14	83	50.00	S. Supply	1920
3957	3	Erick Erickson, et al.	Grey Bull River	5.00	21	52	96	5.000.00	836.70	1921
3958	1	United States of America	North Platte River		11	26	65	400,000.00	Power	1920
3959	1	Nellie S. Fackler	Wagon Hound rCeek		21	31	71	50.00	5.40	1920
3960	3	Pearl Weston	Bretesha Creek		32	52	104		6.00	1919
3961	1	Goshen Ditch Co.	Horse Creek		13	21	62	100.00	160 00	1921
3962	1	C. E. & Maria A. Johnson	N. Fk. S. Fk. Casper Creek		34	35	83	50.00	54.00	1921
3963	1	Chas. Johnson	Crooks Creek	.30	20	28	92	300.00	97.00	1921
3964	2	Oscar Nelson	Bull Creek		13	50	82	200.00	S. Supply	1920
3965	2	J. F. Coffey	Clear Creek	1.933	5	50	82	250.00	20.00	1920
3966	3	B. C. Holman	Ishawooa Creek		29	50	105	25.00	20.00	1920
3967	1	W. R. Eastman	La Bonte Creek	.76	15	31	71	200.00	S. Supply	1921
3968	1	Ware Land & L. S. Co.	Rock Creek		34	23	77	100.00	249.04	1920
3969	3	O. B. C. Kinney, et al.	Wood River	6.99	31	47	101	1,000.00	156 50	1921
3970	1	D. A. Beaton	Sweetwater River		13	29	89	25.00	259.00	1921
3971	2	Lotta W. Manaugh	Stockade Beaver Creek		25	43	61	50 00	35.00	1920
3972	1	C. W. Orchard	Snake River		12	12	91	50 00	39.00	1920
3973	3	Andrew Peterson	Greybull River	.75		51	95	200.00	122.14	1921
3974	3	Jacob B. Miller	Gooseberry Creek	.25	33	47	95	50.00	35.00	1920
3975	3	Jacob B. Miller	Gooseberry Creek	3.00		47	96	25.00	11.00	1920
3976	1	Henry A. Phelps	South Fish Creek	1.00	7	26	70	20.00		1920

APPLICATIONS FOR ENLARGEMENT—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
3977	1	L. A. Clelland	La Prele Creek	.15	9	33	72	100.00	71.60	1921
3978	2	Northern Wyo. Land Co.	Clear Creek	2.61	2	50	82	1,000.00	S. Supply	1920
3979	4	Callie W. Hickey	Sage Creek	.943	21	13	114	60.00	160.00	1921
3980	2	W. W. Hurlbutt	E. Fk. Cruse Creek	.35	23	54	84	100.00	5.50	1920
3981	4	J. H. Bailey	Lava Creek	.48	29	45	113	200.00	168.00	1921
3982	4	R. L. Carpenter	Blacks Fork River	2.189	28	14	116	150.00	160.00	1920
3983	2	Corrine Washburn	Beaver Creek	.67	6	42	61	100.00	7.00	1920
3984	3	Phillip Contor	Cottonwood Creek	.28	24	44	99	170.00	2.00	1921
3985	4	Oscar Kosola, et al.	South Cottonwood Creek	....	35	33	113	1,000.00	324.00	1921
3986	1	Eva Blaine	Elkhorn Creek	1.00	14	30	69	60.00	25.00	1920
3987	3	C. T. Moore	Crystal Springs Creek	.95	21	58	93	340.00	105.00	1920
3988	3	John F. Kitchings	Antelope Creek	....	11	41	93	25.00	15.00	1919
3989	2	Thos. E. Masters, et al.	Tongue River	....	27	57	86	350.00	102.80	1920
3990	2	Town of the City of Newcastle	Stockade Beaver Creek	14.45	5	46	60	160,000.00	....	1923
3991	2	Lotta W. Manaugh	Stockade Beaver Creek	5.56	12	48	61	150.00	158.50	1920
3992	1	J. M. Wombaker	N. Fk. Grand Encampment River	1.50	2	14	84	100.00	S. Supply	1921
3993	1	J. W. Winner	N. Fk. Grand Encampment River	1.50	2	14	84	200 00	S. Supply	1921
3994	3	Chas. Stagner	Big Wind River	....	35	4 N.	3 W.	100.00	50.00	1920
3995	4	Essie B. Allen	South Horse Creek	....	20	34	113	75.00	27.00	1920
3996	4	Betty L. McClintock, et al.	North Piney Creek	1.402	10	31	113	500.00	422.00	1921
3997	4	Leo L. Baker	Horse Creek	....	14	34	112	25.00	20.00	1920
3998	1	Charles Wilson	Laramie River	2.744	2	24	69	150.00	225.60	1920
3999	1	C. H. Sanger	French Creek	1.30	6	14	81	14,000.00	S. Supply	1923
4000	1	Veitch Bros.	Medicine Bow River	.55	16	19	80	800.00	127.00	1921
4001	3	A. S. Nalls	Big Popo Agie River	.636	28	33	100	75.00	15.00	1920
4002	4	Smiths Fork Land & L. S. Co.	Grade Canyon Creek	....	10	25	118	25.00	115.00	1919
4003	2	J. R. Reynolds	Big Goose Creek	....	33	56	84	25.00	1.50	1920
4004	4	Clyde Brewer	South Fork Twin Creek	....	10	21	120	50.00	128.00	1921
4005	3	Phoebe A. Faust	Greybull River	....	28	48	102	100.00	84.00	1920
4006	4	Eugene Bertagnolli	Green River	.644	21	22	109	250.00	96.00	1922
4007	1	Thomas A. Graziel	Horse Creek	....	13	21	62	100.00	95.00	1920
4008	1	Clara Franklin	Aurora Lake Spring	....	8	22	77	100.00	S. Supply	1921
4009	4	E. F. Burton	Salt River	....	35	34	119	200.00	320.00	1921
4010	4	E. N. Bentley	Horse Creek	1.972	4	34	113	1,500.00	127.00	1921

APPLICATIONS FOR ENLARGEMENT—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
4011	1	Archie G. Anderson	Cotton Creek		20	14	83	25.00	S. Supply	1920
4012	1	Archie G. Anderson	Cotton Creek		16	14	83	25.00		1920
4013	1	Archie G. Anderson	Cotton Creek		9	14	83	25.00		1920
4014	1	Louise L. Nieswender	Hale Creek	.30	8	14	84	100.00	20.00	1921
4015	2	F. O. Horton	S. Fk. Rock Creek		25	52	84	50.00	456.00	1921
4016	3	Jennie Blackburn	Gulch		34	47	102	25.00	S. Supply	1921
4017	1	Mary Kortes	Lost Creek		26	26	84	50.00	15.00	1920
4018	4	Ada E. Coats	Willow Creek	1.23	12	35	110	500 00	116.00	1921
4019	3	Thomas F. House	Grey Bull River		11	50	99	100.00	42.00	1921
4020	3	E. Swanson, et al.	Alkali Creek	2.25	2	42	105	350.00	211.00	1921
4021	1	Fremont Michie	Spring		34	32	79	100.00	3.60	1920
4022	1	F. H. Healey	N. Fk. Grand Encampment R.	6.51	11	14	84	10,000.00	1,146.20	1924
4023	1	Hattie Pearl Clark	Bates Creek	1.05	17	31	81	250.00	153.00	1923
4024	4	Chas. C. Alexander	W. Fk. New Fork River	.98	20	36	110	500.00	98.00	1921
4025	3	J. J. Spriggs	Big Popo Agie River	.331	14	33	100	100.00	S. Supply	1921
4026	1	Charlotte M. Bell	Middle Casper Creek		35	33	87	50.00	S. Supply	1921
4027	1	J. H. Griffith	Beaver Creek	.64	23	17	86	200.00	145.00	1921
4028	3	Beaver L. S. Co., et al.	Beaver Creek		10	30	97	500 00	13.80	1920
4029	3	Rudolph Riedel	Big Horn River	.74	13	42	95	2,500.00	49.00	1922
4030	4	Rush L. DeNise	Boulder Creek		23	33	108	1.000.00	4,928.81	1920
4031	1	Wm. G. Nunn	LaBonte Creek	1.566	8	30	71	1,500.00	167.00	1920
4032	1	Harold A. Clarkson	Iron Creek	.011	9	32	82	50.00	S. Supply	1923
4033	1	Bridget Connell, et al.	Spring Gulch		14	17	83	100.00	S. Supply	1921
4034	1	John Hunton	Laramie River		30	26	64	25.00	30.30	1920
4035	1	W. E. Dean	Mountain Creek	.20	10	18	88	300.00	30.00	1920
4036	3	Laura B. Atherly	Greybull River		21	51	95	100.00	18.00	1922
4037	3	D. H. Peery	South Fk. Shoshone River			51	103	250.00	16.00	1920
4038	3	Dorothy Efner Estate	S. Fk. Shoshone River			51	103	100.00	25 10	1920
4039	4	Wayne B. Decker	Henry's Fork Creek	1.379	11	12	114	100.00	160.00	1920
4040	4	Ella Vogel	Gros Ventre River		9	41	116	60 00	12.00	1920
4041	3	Simon Snyder	S. Fk. Shoshone River		17	48	106	50.00	29.00	1920
4042	3	Chas. J. Rhoads	Rattlesnake Creek		5	52	103	50.00	S. Supply	1921
4043	3	Max Wilde	Hunter Creek		9	48	106	25.00	S. Supply	1920
4044	2	E. P. Willson	W. Branch Harney Creek		27	34	67	50.00	S. Supply	1922

APPLICATIONS FOR ENLARGEMENT—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
4045	2	E. P. Willson	W. Branch Harney Creek		27	34	67	50 00	S. Supply	1922
4046	2	E. P. Willson	W. Branch Harney Creek		27	34	67	50.00	S. Supply	1922
4047	2	Myra Morrison	Stockade Beaver Creek	.36	25	43	61	1,000.00	20.60	1922
4048	4	Henry Meyer	Little Sandy River		28	26	105	500 00	97.00	1921
4049	4	Henry Meyer	Little Sandy River		22	26	105	1,500.00	35.50	1921
4050	2	S. M. Snively	Shell Creek		1	52	83	50.00	S. Supply	1921
4051	2	J. Frank Coffey	Clear Creek	3.03	5	50	82	1,200.00	138.50	1921
4052	2	J. Bar U Cattle Co.	S. Fk. Powder River		26	43	81	350.00	28.90	1920
4053	3	Lucie E. Thurston	Greybull River	.25		49	100	50.90	31.00	1921
4054	1	Douglas Reservoirs Co.	La Prele Creek		16	32	73	250.00	305.00	1920
4055	1	Douglas Reservoirs Co.	La Prele Creek		16	32	73	300.00	S. Supply	1920
4056	3	Wm. Blackburn	Bitter Creek			55	98	50.00	S. Supply	1921
4057	3	E. P. Heald	Trail Creek			53	102	25.00	5.50	1920
4058	4	C. L. Roberts	Salt River		35	34	119	100.00	46.00	1921
4059	4	E. A. Richardson	Green River		7	34	111	200.00	109.00	1921
4060	2	Ferdinand Gerer	Rock Creek	3.70	15	51	82	300.00	S. Supply	1921
4061	2	I. W. Blake	Rock Creek		8	51	82	25.00	S. Supply	1921
4062	3	John Hays	Dry Creek	1.86	35	4 N.	2 W.	1,000.00	S. Supply	1922
4063	3	Geo. E. Blythe	Cottonwood Creek	1.04	9	44	98	600.00	48.00	1922
4064	3	R. J. Meigh	Deer Creek	2.78	8	35	89	530.00		1922
4065	3	Lida Persinger	Horse Creek		6	41	106	300.00	24.00	1922
4066	3	G. F. Vickers	N. Fk. Owl Creek	1.00	16	43	100	100.00	95.20	1921
4067	4	Richard Sanderson	Tin Cup Creek		16	35	119	300.00	152 00	1921
4068	4	T. A. Brosman	Pole Creek	.75	6	32	108	500.00	156.00	1921
4069	4	John Lavelle	Kinney Creek		8	15	99	25.00		1922
4070	4	J. L. Hill, et al.	Dell Creek	1.604	22	38	113	800.00	230 00	1921
4071	4	Alfred Bateman	Salt River		35	34	119	100.00	160.00	1921
4072	1	Frank Wedemeyer	Laramie River		19	24	69	20.00	7.20	1921
4073	1	C. B. Kessler	Fox Creek	.12	34	20	62	50.00	5.20	1921
4074	3	Gooseberry Farmers Canal Co.	Wood River		28	47	98	100.00	Supply	1924
4075	3	Gooseberry Farmers Canal Co.	Wood River		14	46	102	1,000.00	S. Supply	1924
4076	3	Adelaide F. Meigh	Deer Creek		29	35	89	50.00	63.00	1922
4077	3	John R. Hinderliter	Dry Cottonwood Creek	2.80	30	8 N.	2 E.	400.00	S. Supply	1922
4078	3	John R. Hinderliter	Red Creek	2.05	6	8 N.	2 E.	700.00	101.60	1922

APPLICATIONS FOR ENLARGEMENT—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
4079	3	Chas. McCumber	Dry Cottonwod Creek	.64	19	8 N.	2 E.	100.00	160.00	1921
4080	4	Addison Moffat	North Piney Creek	1.43	25	31	114	200.00	134.00	1921
4081	2	E. S. Townsend, et al.	Big Goose Creek		18	55	85		16.00	1921
4082	3	Mrs. Betty A. Leavitt	South Beaver Creek		33	55	91	100.00		1921
4083	3	Mrs. Betty A. Leavitt	South Beaver Creek		32	54	91	50.00	S. Supply	1921
4084	4	Claude Johnson, et al.	Smiths Fork Creek	2.756	3	12	116	1,000.00	1,567.00	1922
4085	3	W. F. Unterzuber	Deep Gulch			52	93	100.00	S. Supply	1921
4086	4	Ada R. Pate	Twin Creek		3	21	119	50.00	S. Supply	1921
4087	3	Chas. C. Rate, et al.	North Fk. Big Popo Agie River	.250	13	2 S.	1 E.	500.00	S. Supply	1921
4088	3	C. E. Barnes	Crow Creek	1.50	7	6 N.	1 W.	700.00	429.00	1922
4089	3	M. J. Rhoads	Big Popo Agie River		35	33	100	50.00	10.00	1921
4090	1	Herbert King, et al.	Rock Creek	3.99	29	19	78	11,500.00		1922
4091	1	Herbert King, et al.	One Mile Creek	3.99	29	19	78	9,500.00		1922
4092	1	Herbert King, et al.	Seepage Creek		36	19	78	500.00	S. Supply	1922
4093	1	Herbert King, et al.	Dutton Creek	3.00	20	19	76	1,000.00	S. Supply	1923
4094	1	Herbert King	Dutton Creek		25	19	77	50.00	S. Supply	1923
4095	3	Nyda F. Jones	Deep Gulch			52	93	150.00	S. Supply	1921
4096	1	Swan Land & Cattle Co.	Chugwater Creek		8	23	67	500.00	299.00	1922
4097	1	Saratoga Land & Invs. Co.	North Spring Creek		11	16	85	100.00	480.00	1921
4098	1	Saratoga Land & Invs. Co.	North Spring Creek		11	16	85	100.00	S. Supply	1921
4099	3	Chas. E. Townsend	Clarks Fork River		12	57	102	25.00	27.00	1921
4100	3	L. G. Phelps	North Rawhide Creek		19	49	102	200.00	1,049.00	1922
4101	3	L. G. Phelps	Rawhide Creek	.30	32	49	102	100.00	S. Supply	1922
4102	3	L. G. Phelps	Rawhide Creek		32	49	102	25.00	S. Supply	1922
4103	3	Chas. H. Souter	Little Popo Agie River		5	33	98	300.00	75.00	1921
4104	4	Cottonwood Dev. Co.	Green River	12.00	27	32	111	2,000.00	S. Supply	1923
4105	3	Fred S. Gail	South Fk. Shoshone River			51	103	500.00	28.00	1922
4106	3	Otto F. Wise	Little Popo Agie River	.191	29	34	98	200.00	40.00	1921
4107	3	Richard Y. Warren	Gooseberry Creek		30	47	98	200.00	37.70	1922
4108	2	Ed. Gillette	Little Goose Creek		33	55	84	100.00	59.60	1921
4109	1	Mable M. Veitch	North Platte River	1.65	4	33	77	200.00	18.00	1922
4110	3	James S. Ewalt	Swan Creek	.80	25	51	104	300.00	72.50	1922
4111	3	Lottie Hays	Kirby Creek	.96	5	41	91	700.00	28.00	1923
4112	4	George Craig	Blacks Fork River		30	15	115	100.00	160.00	1921

APPLICATIONS FOR ENLARGEMENT—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Length, Miles	Location of Headgate			Estimated Cost	Number of Acres	Date to be Completed
					Section	Township	Range			
4113	4	A. B. Woodey	Smiths Fork Creek	....	32	13	115	600.00	320.00	1922
4114	4	Christ Regas	Blacks Fork River	1.092	5	13	116	100.00	130.00	1921
4115	1	Glendo Cattle Company	North Platte River	1.70	1	29	68	800.00	146.00	1922
4116	1	Luther Freeman, et al.	La Bonte Creek	....	36	30	72	700.00	24.00	1921
4117	3	Alfred Deschenes	Crystal Creek	3.25	....	54	94	150.00	14.30	1922
4118	3	Richard V. Dennison	Bear Creek	.70	31	43	105	150.00	18.00	1922
4119	1	James L. Silber	Sweetwater River	....	27	28	100	500.00	115.00	1922
4120	3	Josephine Schultz	Paint Creek	....	9	55	103	150.00	36.00	1921
4121	3	Graham Morton	Spring Creek	....	6	48	100	50.00	15.00	1922
4122	1	G. M. Hiatt	Sybille Creek	.315	36	25	69	20.00	19.00	1921
4123	1	Amelia Lee	Poison Spring Creek	....	23	32	82	400.00	71.10	1922
4124	3	Charles F. Feyhl	Greybull River	....	21	51	98	....	18.20	1921
4125	3	H. C. Snell, et al.	Greybull River	....	....	51	95	500.00	395.03	1923
4126	3	H. C. Snell, et al.	Greybull River	....	....	51	95	300.00	129.00	1923
4127	4	Aaron Gordon, et al.	Blacks Fork River	4.19	12	16	115	600.00	384.50	1922

Reservoir Permits Issued During the Two Years Ending September 30, 1920

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Location			Capacity Acre Feet	Estimated Cost	Date to be Completed
				Section	Township	Range			
3491	1	E. R. Spicer	Holman Draw	28	33	79	5.105	$2,500.00	1920
3492	1	Maud M. Bell	Branch Casper Creek	25	33	87	19.10	850.00	1921
3493	1	Mabel I. Hill	Nameless Draw	30	25	67	4.53	650.00	1920
3494	2	Cactus Petroleum Co.	Draw	25	36	65	3.45	342.00	1920
3495	2	Cactus Petroleum Co.	Draw	30	36	64	5.39	394.00	1920
3496	2	Cactus Petroleum Co.	Draw	28	36	64	2.65	390.00	1920
3497	1	Tony Alameda	Fillmore Creek	10	20	91	67.25	2,500.00	1921
3498	1	Warren D. Healey	Bear Springs Creek	14	29	82	16.65	2,000.00	1920
3499	2	Neil Beaton	Stove Gulch	14	38	79	8.731	3,600.00	1920
3500	2	Neil Beaton	Branch of Stove Gulch	11	38	79	4.020	2,000.00	1920
3501	3	Carl Sears	Mexican Creek	32	6 N.	4 E.	1.14	500.00	1922
3502	3	Carl Sears	Mexican Creek	32	6 N.	4 E.	6.25	700.00	1922
3503	3	Wm. P. Jack	Poison Creek	31	37	88	6.25	450.00	1921
3504	3	Elihu Bean	Stagner Creek	12	5 N.	4 E.	1.43	500.00	1921
3505	3	Kathryne S. Gardner, et al.	Gardner Spring No. 1	15	42	91	276.39	5,000.00	1923
3506	1	Harold A. Clarkson	Iron Creek	9	32	82	34.00	3,000.00	1922
3507	2	M. D. Woolery for Ohio Oil Co.	Gulch	33	36	64	2.85	700.00	1920
3508	2	M. D. Woolery for Ohio Oil Co.	Gulch	30	36	64	88.95	3,000.00	1920
3509	3	Louisa Fuller	Branch First Sand Draw	21	39	91	19.50	1,100.00	1921
3510	4	Rasmussen Sheep Co.	Red Wash Draw	16	20	95	1,216.85	2,500.00	1921
3511	3	Carl Stoltz	Logan Gulch	34	34	94	10.10	300.00	1921
3512	3	Carl Stoltz	Logan Gulch	34	34	93	12.75	450.00	1921
3513	2	J. W. Shepperson	Shepperson Draw	11	38	81	65.52	3,000.00	1920
3514	1	Prairie Pipe Line Co.	Abel Creek	11	26	90	5.35	2,000.00	1920
3515	2	Emma S. Van Gorden	Ba Ba Gulch	3	41	75	128.32	1,200.00	1921
3516	2	Frank Neff	Broken Horn Creek	22	40	82	142.00	3,800.00	1920
3517	1	Goshen Ditch Co.	Horse Creek	22	22	62	1,107.00	4,000.00	1922
3518	2	Midwest Refining Co.	Salt Creek	30	40	78	5,486.25	60,000.00	1922
3519	1	D. M. Foreman, et al.	South Brush Creek	23	16	80	198.96	2,000.00	1921
3520	1	Green Mountain Sheep Co.	Camp Creek	1	26	90	1.20	110.00	1921
3521	1	Green Mountain Sheep Co.	Reed Creek	29	27	90	.225	85.00	1921
3522	1	Green Mountain Sheep Co.	Reed Creek	32	27	90	.613	145.00	1921

RESERVOIR PERMITS ISSUED—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Location			Capacity, Acre Feet	Estimated Cost	Date to be Completed
				Section	Township	Range			
3523	1	Green Mountain Sheep Co.	Pack Saddle Creek	31	27	90	17.98	3,500.00	1921
3524	1	Green Mountain Sheep Co.	Pack Saddle Creek	31	27	90	2.075	1,500.00	1921
3525	1	Green Mountain Sheep Co.	Pack Saddle Creek	31	27	90	.70	200.00	1921
3526	1	Green Mountain Sheep Co.	Pack Saddle Creek	32	27	90	.50	150.00	1921
3527	1	Green Mountain Sheep Co.	Pack Saddle Creek	5	26	90	.60	170.00	1921
3528	4	Margaret W. Brannan	Branch of Bear Creek	1	25	99	212.86	2,800.00	1921
3529	4	Margaret W. Brannan	Bear Creek	10	25	98	375.64	5,700.00	1921
3530	1	Joseph M. Carey	Dry Creek	29	14	66	5.13	300.00	1922
3531	1	H. W. Fisch	W. Fk. Deer Creek	33	31	78	95.95	5,000.00	1923
3532	1	E. C Richlin	Red Creek	3	31	80	60.55	2,000.00	1922
3533	3	Seth I. Iiams	Conant Creek	19	34	93	15.00	300.00	1921
3534	1	Henry A. Phelps	South Fish Creek	5	26	70	18.20	550.00	1920
3535	4	Ed. Karel	Towey Wash	21	22	110	34.44	1,500.00	1922
3536	4	Ed. Karel	Wisdom Wash	20	22	110	85.80	3,500.00	1922
3537	1	Ward Barber	Libby Creek	29	16	78	14.70	20.00	1921
3538	1	Ward Barber	Libby Creek	29	16	78	3.00	10.00	1921
3539	1	Dora B. Robinson	Corrall Creek	26	25	72	3.90	350 00	1920
3540	1	Arthur Gaylord	Branch Middle Casper Creek	1	34	86	514.17	5,500.00	1922
3541	2	Samuel C. Hawthorne	Middle Wallow Lake	20	49	80	517.00	200.00	1921
3542	2	Manuel Armenta, et al.	Gulch	10	36	86	2.65	450.00	1922
3543	2	Beaver Valley L. S. Co.	Whoopup Creek	36	43	61	1,735.93	45,979.00	1923
3544	3	E. W. Starr	Flood Gulch	27	37	87	3.35	350.00	1922
3545	1	Horseshoe Live Stock Co.	Horseshoe Creek	25	28	72	3,262.00	120,000.00	1923
3546	3	Thomas Foley	Foley Spring	29	50	100	15.50	500.00	1922
3547	1	Robert Rainey	Dutton Creek	9	19	76	536.70	1,500.00	1921
3548	1	J. J. Corbett	Snow and spring water	33	33	79	8.11	325.00	1921
3549	1	J. J. Corbett	Snow and spring water	33	33	79	15.66	725.00	1921
3550	2	B. A. Carpenter	Bilderback Creek	9	45	80	28.15	600.00	1921
3551	2	Clara M. Lester	Lester Draw	21	38	85	84.19	1,400.00	1921
3552	2	W. A. Sutterfield	Cottonwood Creek	19	38	84	77.68	1.000.00	1921
3553	4	James and E. L. Chesney	Thomas Canyon	11	15	121	128.35	6,763.00	1922
3554	1	Herbert King, et al.	Rock Creek	29	19	77	2,007.00	13,250.00	1921
3555	1	Christena McPherson	McPherson Draw	28	36	79	112.52	2,800.00	1921
3556	3	Jennie Blackburn	Natural Lake	33	47	102	66.25	1,200.00	1922

RESERVOIR PERMITS ISSUED—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Location			Capacity, Acre Feet	Estimated Cost	Date to be Completed
				Section	Township	Range			
3557	1	Richards Bros.	Snowy Zone Creek	31	27	81	6.15	50.00	1920
3558	2	Lewis Pike	Indian Springs Gulch	6	38	84	180.75	5,750.00	1924
3559	2	Isaac W. Lynde	Branch Hoe Creek	16	47	72	12.51	1,000.00	1923
3560	2	Joseph D. Collins	Drainage Draw	20	54	76	2.70	300.00	1920
3561	4	Joseph Markham, et al.	Springs	11	45	114	2,579.70	150.00	1921
3562	1	W. J. Bradley	Springs	1	13	72	1.50	100.00	1921
3563	2	Chas. Parker	Draw	32	55	84	17.30	2,000.00	1923
3564	2	I. W. Blake	Arroyo Draw	15	51	82	12.90	800.00	1920
3565	2	Wenonah E. Andrews	Draw	34	55	85	3.05	600 00	1922
3566	3	Geo. H. Wiederien	Dry Gulch	16	7 N.	1 W.	81.00	1,000.00	1922
3567	1	Charlotte M. Bell	Middle Casper Creek	3	32	87	4.60	1,500.00	1922
3568	1	Florence L. Kirk	Dry Wash	28	29	92	345.75	5,000.00	1922
3569	3	M. H. Smith	Greybull River	29	51	95	579.20	4,150.00	1922
3570	2	Emma Bayer	Bayer Draw	26	38	81	64.50	5,000.00	1921
3571	1	A. E. Torelle	Hot Spring	13	17	84		2,000.00	1921
3572	1	Charles D. Carey	Draw	35	23	67	13.60	550.00	1921
3573	2	Oscar Carlson	Alum Creek	27	55	62	6.40	400.00	1920
3574	3	Hermine Auer	Beaver Creek	16	31	96	112.25	12,000.00	1922
3575	1	Harold A. Clarkson	Iron Creek	7	32	82	10.65	2 000.00	1923
3576	2	Roy B. Marquiss	Belle Fourche River	8	44	73	16.60	263.00	1920
3577	2	Roy B. Marquiss	Belle Fourche River	8	44	73	38.70	275 00	1920
3578	4	T. D. O'Neil	Middle Piney Creek	8	30	115	4,481.52	13,000.00	1924
3579	1	James Clark	Clark Draw	3	32	72	4.00	494.00	1920
3580	2	Joshua B. Huggins	Huggins Creek	32	52	82	30.94	3,500.00	1922
3581	3	Chase Lawrence, et al.	Davis and Fenton Draws	24	54	92	307.50	9,000.00	1924
3582	2	Eugene P. Willson	W. Branch Harney Creek	3	33	67	40.53	2,000.00	1922
3583	2	Eugene P. Willson	W. Branch Harney Creek	34	34	67	41.94	1,600.00	1922
3584	3	Charles H. Wilson	N. Fk. Dick Creek	28	47	102	30.45	2,500.00	1921
3585	3	Charles H. Wilson	N. Fk. Dick Creek	33	47	102	25.25	2,500.00	1921
3586	4	Julius Hilbert	Dry Gulch	27	21	115	31.75	500.00	1921
3587	2	Geo. A. Buell, et al.	S. Fk. Piney Creek	24	52	85	3,640.00	140,000 00	1924
3588	2	Union Oil Co.	Bill's Creek	30	35	65	9.12	2,500.00	1921
3589	2	B. A. Brooks	N. Branch Dry Creek	33	57	85	12.93	1,100.00	1921
3590	4	American Asbestos Mining & Milling Company	Berry Creek				1,053.35	120,000 00	1923

RESERVOIR PERMITS ISSUED—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Location			Capacity, Acre Feet	Estimated Cost	Date to be Completed
				Section	Township	Range			
3591	4	Wm. Bartek	N. Fish Creek	12	23	118	24.45	500.00	1923
3592	3	James Croskey, et al.	North Fk. Owl Creek	3	43	100	166.56	3,250.00	1924
3593	3	James Croskey, et al.	N. Fk. Owl Creek	3	43	100	40.41	2,500.00	1924
3594	3	James Croskey, et al.	N. Fk. Owl Creek	3	43	100	80.90	4,775.00	1924
3595	3	James Croskey, et al.	N. Fk. Owl Creek	2	43	100	84.38	4,340.00	1924
3596	3	Geo. E. Blythe	Cottonwood Creek	17	44	98	18.32	675.00	1922
3597	3	Geo. E. Blythe	Cottonwood Creek	17	44	98	28.82	700.00	1922
3598	2	Carmelo Pedulla	Pedulla Springs	31	47	61	1.00	100 00	1921
3599	2	H. H. Williams	Durky Draw	14	50	74	1.63	150.00	1921
3600	2	Clarence R. Austin	Stone Draw	9	55	74	6.68	500.00	1921
3601	3	Etta Rule	Dry Creek	24	58	96	40.00	1,400 00	1921
3602	3	E. H. Heavy	Red Hill Gulch	22	47	102	7.05	150.00	1921
3603	2	Marshall J. Hannum	Hoe Creek	19	47	73	22.47	175.00	1921
3604	3	Gooseberry Farmers Canal Co.	Wood River	31	47	97	14.506.55	193,325.00	1924
3605	1	E. O. Sinnard	Dry Creek	7	21	62	1,539.50	52,000.00	1922
3606	1	Wm. Peel	Springs	9	19	70	.15	50.00	1922
3607	4	Ada R. Pate	Gooseberry Draw Creek	3	21	119	74.10	2,200.00	1923
3608	4	Ada R. Pate	Gooseberry Draw Creek	34	22	119	12.075	1,000.00	1922
3609	1	Mrs. Nettie Zenor Olson	Zenor Springs	2	20	61	8.00	450.00	1922
3610	1	J. C. Temple	Spring	15	12	87	504.00	6,500.00	1923
3611	1	John Legan	Legan Draw	30	37	82	.60	250.00	1921
3612	1	John Legan	Dry Draw	30	37	82	2.36	500.00	1922
3613	1	John Legan	Dry Draw	30	37	82	1.51	350.00	1921
3614	2	Walker Creek L. S. Co.	Piney Creek	3	35	68	441.50	8,000.00	1922
3615	3	S. Skovgard, et al.	Greybull River	12	47	102	49,458.30	634,700.00	1924
3616	3	S. Skovgard, et al.	Greybull River	28	48	101	42,635.00	754,600.00	1924
3617	1	Herbert King, et al.	Seepage Creek	29	19	77	2,216.00	7,900.00	1922
3618	1	Wm. C. Mentzer	W. Fk. Medicine Bow River	2	17	80	3,330.00	25,000.00	1924
3619	3	L. G. Phelps	North Rawhide Creek	13	49	103	863.50	11,500.00	1924
3620	3	Geo. M. Heald	Spring	34	56	102	.30	100.00	1921
3621	3	Geo. M. Heald	Spring	9	55	102	.20	20.00	1921
3622	1	Selga Jourgensen	Willow Creek	5	31	83	4.05	200.00	1922
3623	1	Selga Jourgensen	Middle Fk. Willow Creek	8	31	83	3.10	300.00	1922
3624	1	Selga Jourgensen	S. Fk. Willow Creek	8	31	83	3.75	250.00	1922

RESERVOIR PERMITS ISSUED—Continued.

Permit No.	Division No.	NAME OF APPLICANT	SOURCE OF APPROPRIATION	Location			Capacity, Acre Feet	Estimated Cost	Date to be Completed
				Section	Township	Range			
3625	1	Selga Jourgensen	Willow Creek	9	31	83	4.35	260.00	1922
3626	1	Selga Jourgensen	Willow Creek	9	31	83	4.25	500.00	1922
3627	1	R. Z. McCoy	North Spring Creek	13	16	85	683.27	2,400.00	1923
3628	3	Lauritz C. Thomsen	Long Hollow Gulch	36	51	101	13.00	2,000.00	1922
3629	1	Charles Ellis	Cottonwood Creek	15	24	80	12.70	1,457.50	1924
3630	1	Glendo Cattle Company	Cottonwood Creek	31	30	67	73.64	500.00	1921
3631	3	Edward Merriam	71 Spring	20	36	90	1.82	350.00	1921
3632	2	Mrs. Joe Collins	Draw	19	54	76	8.80	710.00	1921
3633	1	J. Ross Carpenter	Spring and Dry Creek	19	14	66	5.53	300.00	1922
3634	1	J. Ross Carpenter	Spring and Dry Creek	19	14	66	14.03	400.00	1922
3635	1	Mrs. James W. Walsh	Hay Slough	36	25	81	7.12	400.00	1923
3636	3	Richard V. Dennison	Spring Branch Bear Creek	32	43	105	36.30	700.00	1922
3637	3	Katherine A. T. Duncan	Alkali Creek	14	43	105	23.60	600.00	1923
3638	3	Katherine A. T. Duncan	Alkali Creek	14	43	105	11.50	160.00	1922
3639	1	Frank Walker	Bates Hole Draw	16	26	78	11.00	600.00	1923
3640	1	Frank Walker	Bates Hole Draw	15	26	78	1.62	150 00	1923
3641	1	Frank Walker	Bates Hole Draw	15	26	78	1.25	125.00	1923
3642	1	Roy J. Cardwell	Dry Gulch	17	28	83	36.75	950 00	1923
3643	1	Roy J. Cardwell	Dry Gulch	8	28	83	5.35	400.00	1923
3644	1	Ambrose M. House	Bull Springs Draw	32	25	89	33.58	2,200.00	1922
3645	2	Salt Creek Consolidated Oil Co.	Draw	31	40	78	30.80	4,664.00	1921
3646	2	Salt Creek Consolidated Oil Co.	Draw	31	40	78	3.15	3,305.00	1921
3647	1	Benj. F. Ewing	Trib. Poison Spring Creek	20	32	81	18.70	2,100.00	1923
3648	1	John Mahoney, et al.	Cress Creek	14	26	88	29.12	1,500.00	1923
3649	2	Peter C. Noomen	Dry Creek	12	50	81	224.75	7,500.00	1923
3650	2	Charles H. Weller	Durky Draw	13	50	74	6.31	306.00	1921
3651	3	John B. & B. M. Goff	Natural Lake	26	54	103	663.00	750.00	1922

NORTH PLATTE RIVER BASIN

NORTH PLATTE RIVER NEAR NORTHGATE, COLO.

Location.—In sec. 11, T. 11 N., R. 80 W., at highway bridge on Interstate Highway, 6 miles south of Colorado-Wyoming line and 6 miles northwest of Northgate, in Jackson County. Three small tributaries, Camp, Threemile, and Sixmile creeks, enter North Platte between station and state line. These have very little flow except spring run-off.

Drainage area.—1,440 square miles.

Records available.—May 23, 1915, to September 30, 1920.

Gage.—Gurley water-stage recorder installed April 8, 1918, referred to chain gage located on downstream side of bridge and used since May 13, 1916; original gage, vertical staff on middle pier, referred to same datum.

Diversions.—There are court decrees for diversion of 3,060 second-feet from the North Platte and tributaries in Colorado. During 1919 2,670 acre-feet were diverted from the North Platte basin to the Cache la Poudre drainage, and during 1920 3,840 acre-feet.

Accuracy.—Gage heights from continuous records; rating curve well defined. Results excellent.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER NEAR NORTHGATE, COLO., FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October 1-7	198	177	185	2,570
April 17-30	1,400	500	1,030	29,400
May	1,570	500	804	49,400
June	1,340	216	502	29,900
July	204	99	138	8,480
August	315	76	150	9,220
September	123	70	94	5,590
1919-20				
October	224	70	155	9,530
May 14-31	3,390	2,220	2,860	102,000
June	3,260	1,740	2,430	145 000
July	1,860	500	921	56,600
August	535	298	410	25 200
September	298	138	229	13,600

NORTH PLATTE RIVER AT SARATOGA

Location.—At highway bridge at Saratoga, in Carbon County. Nearest tributary, Spring Creek, enters 2 miles above.

Drainage area.—2,880 square miles.

Records available.—June 9, 1903, to October 31, 1906; April 1, 1909, to December 17, 1909; April 27, 1911, to October 31, 1912; April 1, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Chain gage read by Mrs. R. R. Riggs and Miss Carrie E. Priquet; located on upstream side of bridge. Original gage read prior to 1911 was vertical staff located 100 yards below bridge. No determined relation between gages.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 83 second-feet from the North Platte between Saratoga and State line.

Accuracy.—Gage read twice daily; rating curve well defined. Results excellent except during ice periods, for which they are fair.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER AT SARATOGA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	860	450	599	36,800
November	670	255	472	28,100
December	450	215	318	19,600
January	275	215	265	16,300
February	295	215	261	14,500
March	1,930	275	496	30,500
April	2,940	590	1,570	93,400
May	6,150	2,110	3,560	219,000
June	4,450	555	1,910	114,000
July	576	154	272	16,700
August	396	139	223	13,700
September	223	145	163	9,700
The year	6,150	139	845	612,000
1919-20				
October	326	151	272	16,700
November	380	160	290	17,300
December			288	17,700
January	304	227	271	16,700
February	365	175	290	16,700
March	450	287	341	21,000
April	1,440	340	720	42,800
May	11,300	1,760	6,850	421,000
June	11,300	5,000	8,360	497,000
July	5,000	810	1,890	116,000
August	915	420	637	39,200
September	485	295	393	23,400
The year	11,300	151	1,740	1,250,000

NORTH PLATTE RIVER ABOVE PATHFINDER

Location.—In sec. 27, T. 26 N., R. 84 W., 900 feet below mouth of Lost Creek and three-quarters mile below mouth of Black Canyon, in Carbon County. Backwater from Pathfinder reservoir reaches within 2½ miles of station.

Drainage area.—7,410 square miles.

Records available.—October 7, 1913, to September 30, 1920.

Gage—Friez water-stage register located at right bank 900 feet below Lost Creek.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 94 second-feet from North Platte River between Saratoga and the station above Pathfinder.

Accuracy.—Stage-discharge relation practically permanent; affected by ice during winter months. Rating curve well defined between 400 and 12,000 second-feet. Operation of water-stage recorder satisfactory. Results excellent.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER ABOVE PATHFINDER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,050	543	698	42,900
November	750	292	531	31,600
April	3,930	1,130	2,290	136 000
May	7,870	2,800	4,430	272,000
June	7,400	820	2,650	158,000
July	750	183	375	23.100
August	831	136	324	19,900
September	269	144	179	10,700
1919-20				
October	473	224	366	22,500
November	614	215	443	26,400
March 13-31	1,290	663	918	34,600
April	4,770	589	1,720	102,000
May	13,800	1,410	8,630	531,000
June	14,400	6,520	11,000	655,000
July	6,520	1,120	2,580	159,000
August	1,060	621	851	52,300
September	754	348	509	30,300

NORTH PLATTE RIVER AT PATHFINDER

Location.—In sec. 24, T. 29 N., R. 84 W., one-quarter mile below Pathfinder dam and one-third mile below the old postoffice of Pathfinder, in Natrona County. Nearest tributary, Canyon Creek, enters 2 miles above, in the reservoir.

Drainage area.—10,700 square miles.

Records available.—May 9, 1905, to September 30, 1920.

Gage.—Chain gage read by J. C. Austin; located at left bank one-quarter mile below Pathfinder dam.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 383 second-feet from tributaries entering the North Platte between the station above Pathfinder and this station. Near Whalen, 150 miles below, the water from Pathfinder reservoir is diverted by the Interstate Canal and used to irrigate land in Nebraska and Wyoming.

Regulation.—The Pathfinder dam forms a reservoir of 1,025,000 acre-feet capacity which materially changes the natural run-off of the river.

Cooperation.—Records furnished by United States Reclamation Service.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER AT PATHFINDER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,500	25	541	33,300
November	25	25	25.0	1,490
December	25	15	19.5	1,200
January	15	15	15.0	922
February	15	15	15.0	833
March	15	15	15.0	922
April	1,080	15	82.7	4,920
May	5,120	1,480	2,990	184,000
June	5,760	4,500	5,220	311,000
July	4,580	3,580	3,960	243,000
August	4,000	2,900	3,450	212,000
September	3,160	1,500	2,070	123,000
The year	5,760	15	1,540	1,120,000
1919-20				
October	2,000	15	1,420	87,300
November	15	15	15	893
December	15	15	15	922
January	15	15	15	922
February	15	15	15	863
March	15	15	15	922
April	15	15	15	893
May	5,410	15	684	42,100
June	12,300	5,450	8,960	533,000
July	6,540	4,210	5,340	328,000
August	4,250	3,610	3,970	244,000
September	3,610	490	2,260	134,000
The year	12,300	15	1,890	1,370,000

NORTH PLATTE RIVER NEAR CASPER

Location.—In sec. 31, T. 32 N., R. 81 W., at highway bridge at Speas ranch, one-half mile below Bessemer Canyon, in Natrona County. Nearest tributary, Bates Creek, enters about 3 miles upstream.

Drainage area.—Not measured.

Records available.—April 9, 1917, to September 30, 1919.

Gage.—Vertical staff.

Channel and control.—Channel apparently permanent, control located below bridge.

Diversions.—Prior to July 1, 1919, there were no adjudicated diversions from North Platte River between this station and Pathfinder reservoir.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER NEAR CASPER, FOR THE YEAR ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May	4,830	970	2,550	157,000
June	5,530	4,190	5,040	300,000
July	4,710	3,240	3,820	235,000
August	3,860	2,800	3,300	203,000
September	2,870	1,440	2,000	119,000
The period				1,010,000

NORTH PLATTE RIVER NEAR DOUGLAS

Location.—In sec. 17, T. 32 N., R. 71 W., at highway bridge 1½ miles below Douglas, in Converse County. Nearest tributary, Wagon Hound Creek, enters 10 miles below.

Drainage area.—Not measured.

Records available.—April 1 to September 30, 1919.

Gage.—Vertical staff attached to upstream end of second pile bent from right end; read by Thornton Brow.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 25 second-feet from North Platte River between the station near Casper and this one.

Regulation.—Flow regulated by Pathfinder reservoir.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER NEAR DOUGLAS, FOR THE YEAR ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	1,110	280	481	28,600
May	4,230	1,200	2,710	167,000
June	5,040	3,700	4,650	277,000
July	4,080	3,320	3,810	234,000
August	4,230	3,180	3,650	224,000
September	3,180	1,490	2,290	136,000
The period				1,070,000

NORTH PLATTE RIVER ABOVE AND BELOW WHALEN

Location.—At diversion dam at Whalen, in Goshen County, in sec. 11, T. 26 N., R. 65 W. Nearest important tributary is Cottonwood Canyon Creek, an intermittent stream which enters 1½ miles below.

Drainage area.—16,300 square miles.

Records available.—May 1, 1909, to September 30, 1920. The records above Whalen represent the discharge above the dam, which is an overfall weir, and those below Whalen, the water passing over the weir—the difference representing the amount diverted by the Interstate and Fort Laramie canals.

Gage.—To determine the flow over the weir a vertical staff is used, its zero being at the weir crest. The discharge is then computed by a weir formula. There are also four sluice gates in the dam, through which the discharge is computed. In the river, 75 feet downstream from the crest gage, is a second gage, with zero 10 feet below that of the weir gage. The second gage is only used in computing the discharge through the gates when the openings are submerged. The discharge through the head gates of the canals is computed from the gate openings. A vertical staff located in the canals below the headgates is used in computing the discharge when the headgate openings are submerged.

Diversions.—Prior to July 1, 1919, adjudicated diversions from North Platte River of 429 second-feet between Pathfinder reservoir and Whalen, exclusive of the diversion by the United States Reclamation Service. Between Whalen and the State line, adjudicated diversions of 236 second-feet.

Regulation.—The discharge represents chiefly the effect of the Pathfinder Reservoir which stores water for use in the Interstate and Fort Laramie canals.

Cooperation.—Records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF NORTH PLATTE RIVER ABOVE WHALEN, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	2,090	500	1,080	66,400
November	500	350	403	24,000
December	350	200	253	15,600
January	300	200	223	13,700
February	370	200	291	16,200
March	200	175	192	11,800
April	1,150	175	473	28,100
May	4,730	936	2,670	164,000
June	6,730	4 060	5,130	305,000
July	5,800	3 500	4,000	246 000
August	4,630	2,950	3,580	220 000
September	3,130	1,340	2,040	121,000
The year	6,730	175	1,700	1,230,000
1919-20				
October	2 010	960	1,500	92 200
November	1,010	40	230	13 700
December	170	75	99.5	6,120
January	200	85	128	7 870
February	225	30	145	8,340
March	1,960	50	612	37.600
April	1,980	165	915	54,400
May	11,200	1,900	5.430	334,000
June	11,200	6,690	8 750	521,000
July	7 330	4 360	5,810	357,000
August	4 660	3,580	4 230	260,000
September	4,100	1,310	2,890	172,000
The year	11,200	30	2,570	1,860 000

MONTHLY DISCHARGE OF NORTH PLATTE RIVER BELOW WHALEN, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	1,440	300	641	39,400
November	500	350	403	24,000
December	350	200	253	15 600
January	300	200	223	13,700
February	370	200	291	16 200
March	200	175	192	11,800
April	1.150	175	420	25,000
May	2,940	545	1,590	97,800
June	4 800	2,180	3,210	191,000
July	3,910	1,520	2,020	124,000
August	2 740	1.070	1,690	104 000
September	1,330	320	698	41,500
The year	4,800	175	973	704,000
1919-20				
October	1,440	425	604	37,100
November	1,010	35	205	12,200
December	150	55	79.5	4,890
January	180	65	108	6 640
February	205	20	125	7,190
March	1,940	35	592	36,400
April	1,960	145	895	53 300
May	11,200	1,880	5 140	316,000
June	10,800	5,560	7.330	436,000
July	5,740	2,370	3,900	240,000
August	2 880	1,790	2,430	149,000
September	2,460	615	1,550	92,200
The year	11,200	20	1,920	1,390,000

BIG CREEK NEAR BIG CREEK

Location.—In sec. 32, T. 13 N., R. 81 W., at Big Creek ranger station 2 miles west of Big Creek postoffice in Carbon County. No important tributary within several miles.

Drainage area.—123 square miles.

Records available.—May 7, 1911, to June 30, 1912; April 4, 1915, to Sept. 30, 1920. State engineer maintained station during 1913 and 1914.

Gage.—Stevens eight-day recording gage installed May 13, 1918, and referred to vertical staff on left bank 50 feet from ranger station. Prior to April 29, 1915, staff gage was placed one foot farther out in stream and gave reading slightly different, although referred to same datum.

Diversions.—Prior to July 1, 1919, there were no adjudicated diversions from Big Creek above station in Wyoming, but below adjudicated diversions amounted to 100 second-feet. In Colorado, the Independence ditch diverts approximately 80 second-feet from Big Lake to the North Platte drainage basin, usually from June 10 to July 10 each year.

Accuracy.—Gage heights from continuous records except for short intervals; rating curve well defined. Results excellent except during periods of missing gage heights, for which they are good.

MONTHLY DISCHARGE OF BIG CREEK NEAR BIG CREEK, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	61	24	34.9	2,150
April 16-30	175	26	91.1	2,710
May	431	88	221	13,600
June	295	86	165	9,820
July	120	20	49.3	3,030
August	135	17	38.0	2,340
September	36	11	20.1	1,200
1919-20				
October	25	16	19.0	1.170
May 9-31	700	189	388	17,700
June	795	441	631	37,500
July	429	110	207	12,700
August	133	51	70.7	4,350
September	66	27	40.5	2,410

FRENCH CREEK NEAR FRENCH

Location.—In sec. 5, T. 14 N., R. 81 W., at Jenkins ranch, 2½ miles southeast of French, in Carbon County. No tributary between station and mouth, 2 miles below.

Drainage area.—64 square miles.

Records available.—April 30, 1911, to October 31, 1912; April 1, 1915, to September 30, 1920. State engineer maintained station at original site in 1913 and 1914.

Gage.—Vertical staff located at left abutment of highway bridge used since June 2, 1920; read by Miss Pearl Jenkins and Mrs. Mary S. Jenkins. Original gage located one mile upstream, read until April 10, 1918, when it was moved to point 480 feet downstream from present location. No determined relation between different gages.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 4.3 second-feet from French Creek; part above station not known.

Accuracy.—Gage read twice daily; rating curves fairly well defined. Results good.

MONTHLY DISCHARGE OF FRENCH CREEK NEAR FRENCH, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	89	15	35.5	2,110
May	658	80	262	16,100
June	330	102	235	14,000
July	114	40	63.9	3,930
1920				
April	29	17	22.8	1,360
May	655	22	208	12,800
June	980	409	597	35,500
July	395	56	171	10,500
August	130	38	62.9	3,870
September	56	19	29.9	1,780
The period				65,800

ENCAMPMENT RIVER AT ENCAMPMENT

Location.—In sec. 6, T. 14 N., R. 83 W., at lower end of smelter grounds at Encampment, in Carbon County. Nearest tributary, North Fork, enters one mile above.

Drainage area.—219 square miles.

Records available.—May 2, 1911, to October 31, 1912; May 29, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Chain gage read by Miss Ruth Metcalf and L. A. Cunningham; located on left bank at tailing flume which crosses the river. Prior to June 6, 1912, gage was located 175 feet farther downstream, and although referred to same datum, read approximately one foot lower, due to the slope of the river.

Diversions.—Three large irrigation ditches divert water at a point one mile above the station. Water is also diverted below the station. Prior to July 1, 1919, adjudicated diversions from Encampment River amounting to 78 second-feet.

Accuracy.—Gage read twice daily; rating curves well defined, except during period June 1 to November 1, 1919, when control shifted slightly. Results good.

MONTHLY DISCHARGE OF ENCAMPMENT RIVER AT ENCAMPMENT, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	340	50	96.5	5.930
November 1-20	88	71	77.7	3,080
April 13-30	695	66	383	13,700
May	1.970	758	1 340	82 400
June	1,020	168	595	35,400
July	158	3	52.7	3,240
August	69	19	29.5	1,810
September	68	24	41.2	2,450
1919-20				
October	58	39	50.2	3,090
May 11-31	2,890	500	1,630	67,900
June	2,960	1,020	1,980	118,000
July	980	79	351	21,600
August	130	36	59.9	3,680
September	100	30	53.8	3,200

JACK CREEK AT MATHESON'S RANCH NEAR SARATOGA

Location.—About sec. 36, T. 17 N., R. 86 W., at Matheson's ranch, 14 miles southwest of Saratoga, in Carbon County. Nearest tributary, North Jack Creek, enters some distance below.

Drainage area.—32 square miles.

Records available.—August 23, 1913, to September 19, 1917; April 20, 1919, to September 30, 1920.

Gage.—Vertical staff at left abutment of wagon bridge 1,000 feet below ranch house, read by Miss Kathleen Montgomery. Gage originally located 200 feet above present site; moved 800 feet farther upstream August 15, 1915, and read until June 13, 1917. No determined relation between readings on various gages.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 9 second-feet from Jack Creek above station and 93 second-feet below.

Accuracy.—Gage read twice daily, rating curves fairly well defined; results fair.

MONTHLY DISCHARGE OF JACK CREEK AT MATHESON'S RANCH NEAR SARATOGA, FOR THE YEARS ENDING SEPT. 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April 20-30	59	23	48.5	1,060
May	97	42	59.2	3,640
June	52	36	45.1	2,680
July	33	2	9.5	584
August	6	0	2.2	135
September	9	2	3.2	190
The period				8,290
1919-20				
October	10	4	7.2	443
April 24-30	16	6	11.7	162
May	293	24	128	7,870
June	184	59	136	8,090
July	54	8	22.4	1,380
August	14	10	10.6	652
September	10	3	5.4	321

MEDICINE BOW RIVER NEAR MEDICINE BOW

Location.—In sec. 7, T. 20 N., R. 79 W., at private bridge at Johnson's ranch 14 miles southwest of Medicine Bow, in Carbon County. Nearest tributary, Wagonhound Creek, enters 3 miles below.

Drainage area.—178 square miles.

Records available.—June 4, 1911, to November 30, 1912; May 5, 1915, to November 3, 1917; May 1, 1919, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Vertical staff read by Mrs. S. W. Johnson; located at downstream side of left abutment. Gage used during 1911 and 1912 was located 600 feet upstream and referred to different datum.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 207 second-feet from Medicine Bow River above station, and 72 second-feet below.

Accuracy.—Gage read twice daily; rating curve well defined below 1,000 second-feet; results excellent up to 1,000 second-feet, above which they are fair.

MONTHLY DISCHARGE OF MEDICINE BOW RIVER NEAR MEDICINE BOW, FOR THE YEARS ENDING SEPT. 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
May	1,180	125	430	26,400
June	424	15	187	11,100
July	14	1	7.0	430
August	46	0	8.1	498
September	16	0	5.0	298
The period				38,700
1919-20				
October	39	8	19.9	1,220
November	53	23	30.8	1,830
March 21-31	62	47	53.5	1,170
April	142	34	69.8	4,150
May	1,290	79	461	28,300
June	1,840	430	953	56,700
July	430	18	93.3	5,740
August	46	13	24.5	1,510
September	27	3	13.3	791

SAGE CREEK ABOVE PATHFINDER

Location.—In sec. 3, T. 26 N., R. 84 W., at footbridge at Vivion's ranch 25 miles above Pathfinder dam. No tributary between station and mouth 2 miles below.

Drainage area.—182 square miles.

Records available.—March 20, 1915, to September 30, 1920.

Gage.—Vertical staff read by Mrs. H. L. McAlister; located 5 feet above foot bridge at left bank.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 15 second-feet from Sage Creek, all above station.

Accruacy.—Stage-discharge relation practically permanent; affected by ice during winter months. Rating curve well defined between 2 and 250 second-feet. Gage read to hundredths twice daily. Results good.

MONTHLY DISCHARGE OF SAGE CREEK ABOVE PATHFINDER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	9.0	3.6	4.41	271
November 1-22	12	9.0	10.4	454
March 16-31	22	8	12.3	390
April	40	7	23.7	1,410
May	23	0.1	6.04	371
June	0.6	0.2	.36	21.4
July	0.4	0.1	.25	15.4
August	1.0	0.0	.17	10.5
September	0.6	0.1	.42	25.0
1919-20				
October 1-9	3.0	0.3	1.73	30.9
November 1-11	6.9	4.5	5.52	120
March 14-31	100	16	30.7	1,100
April	550	11	91.7	5,460
May	248	92	133	8,180
June	69	1.3	27.4	1,630
July	1.3	.2	.72	44.3
August	1.2	.3	.86	52.9
September	.9	.4	.50	29.8

DEWEESE CREEK NEAR ALCOVA

Location.—In sec. 18, T. 27 N., R. 84 W., at Weaver's ranch near entrance of creek into Pathfinder reservoir, in Carbon County.

Drainage area.—41 square miles.

Records available.—March 4, 1917, to September 30, 1920.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 4.4 second-feet from Deweese Creek above station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF DEWEESE CREEK NEAR ALCOVA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	2.7	0.2	1.87	111
May	4.6	.2	1.92	118
June	0.2	.2	.20	12
July	0.2	.1	.11	7
August	0.1	.1	.10	6
September	0.1	.1	.10	6
The period				260
1920				
April	26	0.1	12.1	720
May	38	8.4	20.2	1,240
June	38	2.7	21.5	1,280
July	2.7	0.1	1.94	119
August	0.1	.1	.10	6
September	.1	.1	.10	6
The period				3,370

SAND CREEK NEAR ALCOVA

Location.—About sec. 25, T. 28 N., R. 85 W., at Weaver's ranch, 20 miles southwest of Alcova, in Carbon County. No tributary between station and Pathfinder reservoir, the flow line of which is one-half mile below.

Drainage area.—70 square miles.

Records available.—March 23, 1915, to September 30, 1920.

Gage.—Vertical staff read by A. L. Johnson and P. J. Wilder.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 28 second-feet from Sand Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF SAND CREEK NEAR ALCOVA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	11.4	3.7	5.32	317
May	6.6	0	2.13	131
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period				448
1920				
April	59	1.0	7.53	448
May	12	1.0	2.95	181
June	4.9	0.1	3.25	193
July	0.2	.1	.10	6
August	1.3	.1	.94	58
September	0.2	.2	.20	12
The period				898

CANYON CREEK NEAR ALCOVA

Location.—About sec. 2, T. 28 N., R. 84 W., at Irvine's ranch, 12 miles southwest of Alcova, in Carbon County. No tributary between station and Pathfinder reservoir, the flow line of which is a mile below.

Drainage area.—54 square miles.

Records available.—April 1, 1915, to September 30, 1920.

Gage.—Vertical staff read by F. J. Irvine.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 3.9 second-feet from Canyon Creek, and 13 second-feet from tributaries entering above.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF CANYON CREEK NEAR ALCOVA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	9.4	3.1	6.27	373
May	5.1	0.1	1.85	114
June	7.7	0	.54	32
July	1.1	0	.18	11
August	0	0	0	0
September	1.5	0	.20	12
The period				542
1920				
April	236	7.2	72.5	4,310
May	286	5.9	67.2	4,130
June	7.2	0.4	3.04	181
July	3.2	0	1.92	118
August	2.9	0	.54	33
September	3.4	2.4	2.68	159
The period				8,930

SWEETWATER RIVER NEAR ALCOVA

Location.—In sec. 17, T. 29 N., R. 86 W., at Schoonmaker's ranch 27 miles west of Alcova, in Natrona County. Backwater from Pathfinder reservoir comes to a point 5 miles below. Nearest tributary, Dry Creek, enters 6 miles below.

Drainage area.—2,270 square miles.

Records available.—August 28, 1913, to September 30, 1920.

Gage.—Vertical staff read by W. H. Grieve; located on left bank at old bridge abutment 200 feet above footbridge.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 170 second feet from Sweetwater River above the station. The original diversions below have been extinguished by Pathfinder reservoir.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF SWEETWATER RIVER NEAR ALCOVA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October 1-12	48	43	46.7	1.110
March 16-31	105	77	85.1	2,700
April	288	80	171	10,200
May	236	94	129	7,930
June	147	16	58.9	3,500
July	21	2	5.9	363
August	8	2	2.6	160
September	18	2	8.0	476
1920				
April	1.580	93	545	32,400
May	1,610	323	1,080	66,400
June	1,160	248	674	40,100
July	212	33	83.8	5,150
August	50	31	40.1	2,470
September	42	25	31.8	1,890
The period				148,000

HORSE CREEK NEAR ALCOVA

Location.—About sec. 22, T. 30 N., R. 85 W., at highway bridge near Bothwell's ranch, 16 miles west of Alcova, in Natrona County. No tributary between station and Pathfinder reservoir, the flow line of which is one-half mile below.

Drainage area.—119 square miles.

Records available.—March 23, 1915, to September 30, 1920.

Gage.—Vertical staff read by A. L. Johnson, and P. L. Wilder; located at right bank at lower side of bridge.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 11 second-feet from Horse Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF HORSE CREEK NEAR ALCOVA, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	13.6	2.2	5.46	325
May	2.2	1.0	1.19	73
June	1	1	1.0	60
July	1	1	1.0	61
August	1	1	1.0	61
September	1	1	1.0	60
The period				640
1920				
April	60	7.1	23.4	1,400
May	60	4.6	24.6	1,510
June	4.6	3.0	4.05	241
July	2.5	2.0	2.08	128
August	3	2	2.4	148
September	3	3	3.0	179
The period				3,610

BATES CREEK NEAR CASPER

Location.—Approximately in sec. 12, T. 31 N., R. 82 W., near mouth of creek about 17 miles southwest of Casper, in Natrona County.

Drainage area.—383 square miles.

Records available.—April 10, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 74 second-feet from Bates Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF BATES CREEK NEAR CASPER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	319	9	53.8	3,200
May	50	0	5.3	326
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period				3,530
1920				
April	425	3	171	10,200
May	1,730	165	598	36,800
June	165	1	33.9	2,020
July	26	0	2.6	160
August	0	0	0	0
September	0	0	0	0
The period				49,200

DEER CREEK AT GLENROCK

Location.—In sec. 4, T. 33 N., R. 75 W., near mouth of creek at Glenrock, in Converse County.

Drainage area.—63 square miles.

Records available.—April 11, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 48 second-feet from Deer Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF DEER CREEK AT GLENROCK, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	540	6	201	12,000
May	323	98	201	12,400
June	104	1	42.9	2,550
July	0	0	0	0
August	2	0	.52	32
September	5	2	3.5	208
The period				27,200
1920				
April	488	4	97.1	5,780
May	2,030	77	1,100	67,600
June	127	1	35.4	2,110
July	44	1	9.7	596
August	4	1	1.7	105
September	10	3	4.5	268
The period				76,500

BOXELDER CREEK NEAR CAREYHURST

Location.—Approximately in sec. 7, T. 33 N., R. 73 W., near mouth of creek, 1½ miles east of Careyhurst, in Converse County.

Drainage area.—193 square miles.

Records available.—May 17 to October 31, 1911; April 9, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 80 second-feet from Boxelder Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF BOXELDER CREEK NEAR CAREYHURST, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	248	9	75.9	4,520
May	119	4	34.4	2,120
June	4	4	4.0	238
July	4	4	4.0	246
August	4	4	4.0	246
September	4	4	4.0	238
The period				7,610
1920				
April	282	4	76.9	4,580
May	1,420	102	759	46,700
June	477	12	143	8,510
July	12	4	4.8	295
August	4	4	4.0	246
September	4	4	4.0	238
The period				60,600

LA PRELE CREEK NEAR DOUGLAS

Location.—In sec. 6, T. 31 N., R. 73 W., just above high water line of La Prele reservoir, 16 miles southwest of Douglas, Converse County. Nearest tributary, an unnamed stream enters 1 mile above.

Drainage area.—136 square miles.

Records available.—August 25, 1919, to September 30, 1920.

Gage.—Gurley water-stage recorder on right bank.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 36 second-feet from La Prele Creek above station.

Accuracy.—Gage heights from continuous record except for short intervals; rating curve fairly well defined. Results good.

MONTHLY DISCHARGE OF LA PRELE CREEK NEAR DOUGLAS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
August 25-31	0.5	0.3	0.37	5.1
September	.5	.3	.42	25.0
1919-20				
October	5.0	0.4	1.81	111
November	6.7	2.0	5.25	312
December	8	1	2.90	178
January	10	2	5.74	353
February	15	1.1	6.63	381
March	18	1.0	10.3	633
April	134	11	69.4	4,130
May	900	205	511	31,400
June	312	10	75.9	4,520
July	17	6	10.5	646
August	8	2.6	4.54	279
September	6	3.4	4.63	276
The year	900	0.4	59.5	43,200

WAGON HOUND CREEK NEAR LABONTE

Location.—Approximately in Sec. 16, T. 31 N., R. 71 W., near mouth of creek at Eastman's Ranch, 3 miles east of Labonte, in Converse county.

Drainage area.—145 square miles.

Records available.—April 11, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 24 second-feet from Wagon Hound Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF WAGONHOUND CREEK NEAR LABONTE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	122	5	36.7	2,180
May	20	0	1.77	109
June	2	0	.37	22
July	29	0	.94	58
August	1	0	.03	2
September	0	0	0	0
The period				2,370
1920				
April	359	5	108	6,430
May	907	19	462	28,400
June	311	1	22.4	1,330
July	5	1	3.1	191
August	138	1	10.3	633
September	1	1	1.0	60
The period				37,000

LA BONTE CREEK NEAR LABONTE

Location.—Approximately in sec. 15, T. 31 N., R. 71 W., at Soden's ranch near mouth of creek, 2 miles east of Labonte, in Converse County.

Drainage area.—270 square miles.

Records available.—April 12, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 43 second-feet from La Bonte Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF LA BONTE CREEK NEAR LABONTE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	381	30	162	9,640
May	226	2	64.4	3,960
June	683	1	30.4	1,810
July	309	1	18.9	1,160
August	28	1	5.1	314
September	1	1	1.0	60
The period				16,900
1920				
April	355	20	161	9,580
May	2,500	355	1,070	65,800
June	315	45	113	6,720
July	103	45	58.4	3,590
August	70	55	58.9	3,620
September	70	5	15.0	893
The period				90,200

HORSESHOE CREEK NEAR GLENDO

Location.—Approximately in sec. 26, T. 29 N., R. 68 W., at Hauf's ranch near mouth of creek 4 miles southeast of Glendo, in Platte county.

Drainage area.—203 square miles.

Records available.—April 16, 1916, to September 30, 1919.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 86 second-feet from Horseshoe Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF HORSESHOE CREEK NEAR GLENDO, FOR THE YEAR ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	161	5	99.1	5,900
May	122	14	56.9	3,500
June	12	0	1.8	107
July	141	0	6.0	369
August	0	0	0	0
September	0	0	0	0
The period				9,880

COTTONWOOD CREEK NEAR WENDOVER

Location.—Approximately in sec. 16, T. 27 N., R. 67 W., near mouth of creek, 1½ miles south of Wendover, in Platte County.

Drainage area.—150 square miles.

Records available.—April 19, 1916, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 31 second-feet from Cottonwood Creek, all above the station.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF COTTONWOOD CREEK NEAR WENDOVER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	3.8	2.6	3.00	179
May	3.5	3.2	3.41	210
June	3.5	.2	1.86	111
July	.2	.2	.20	12
August	.2	.2	.20	12
September	.2	.2	.20	12
The period				536
1920				
April	27	2	2.8	167
May	396	14	145	8,920
June	15	3	6.5	387
July	4	2	3.4	209
August	116	2	5.8	357
September	2	2	2.0	119
The period				10,200

LARAMIE RIVER NEAR JELM

Location.—In sec. 15, T. 12 N., R. 77 W., at highway bridge at Boswell's ranch, one-fourth mile below Colorado-Wyoming line, four miles south of Jelm, in Albany County.

Drainage area.—293 square miles.

Records available.—May 7, 1911, to September 30, 1920. From June 22, 1904, to October 31, 1905, a station was maintained at Decker's ranch, one-half mile south of the State line. The records at the two stations are practically comparable, as there are no tributaries nor diversions of any account between.

Gage.—Friez water-stage recorder installed April 26, 1919, on down-stream side of center pier, and referred to same datum as staff gage at right abutment used previously.

Diversions.—Court decrees for diversions of 349 second-feet from Laramie River above station and 800 second-feet from tributaries. Of this amount, 688 second-feet are for diversion into Cache la Poudre drainage basin. During 1919, 16,910 acre-feet were diverted from June to October, and during 1920 13,880 acre-feet were diverted. There is also a conditional decree not exceeding 1,235 second-feet into the Cache la Poudre basin through the Laramie-Poudre tunnel. During 1919, the tunnel diverted 4,090 acre-feet, and during 1920, 12,370 acre-feet.

Cooperation.—Station maintained in cooperation with State engineer of Colorado.

Accuracy.—Gage heights from continuous record; rating curve well defined. Results good.

MONTHLY DISCHARGE OF LARAMIE RIVER NEAR JELM, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April 25-30	317	182	249	2,960
May	708	185	425	26,100
June	497	147	282	16,800
July	190	50	91.8	5,640
August	114	28	54.9	3,380
September	67	26	37.8	2,250
The period				57,100
1919-20				
October 1-25	50	34	42.2	2,090
May	1,520	100	590	36,300
June	2,130	796	1,390	82,700
July	756	138	284	17,500
August	395	68	148	9,100
September	114	58	75.9	4,520

LARAMIE RIVER AND PIONEER CANAL NEAR WOODS

Location.—In sec. 36, T. 14 N., R. 77 W., at the diversion dam for Pioneer Canal, two miles above Woods Postoffice, in Albany County. Nearest important tributary, Fox Creek, enters three miles above.

Drainage area.—409 square miles.

Records available.—April 16, 1912, to September 30, 1920. From 1895 to 1900, and from May 7 to November 11, 1911, a station was maintained at Woods Landing in Sec. 11, T. 13 N., R. 77 W. The records are not directly comparable as Fox Creek enters between and a few small ditches divert water.

Gage.—Bristol water-stage recorder whose datum is the crest of the dam. Gage originally located at left end of dam just below Pioneer Canal headgates. On September 23, 1915, gage was moved to upper wing wall of headgates, and although it is actually above the canal intake it still indicates the amount passing the dam as it is in the pool formed by diversion dam. Chain gage in Pioneer Canal is located at the Johnson bridge 1½ miles below intake. It is read by an employee of the Laramie Water Company.

Diversions.—By decree of district court dated December 27, 1912, there were adjudicated diversions of approximately 10 second-feet from Laramie River between the State Line and Pioneer dam, exclusive of the Pioneer Canal, which has decrees for 282 second-feet.

Regulation.—None, as pond above dam is too small to have any appreciable effect on flow. Whenever canal headgates are closed the discharge over dam increases.

Accuracy.—(River) Gage heights from continuous records except for period August 18 to September 30, 1919, for which weekly gage heights are available; rating curve well defined. Results good for 1919 and excellent for 1920. (Canal) Gage read once daily except for period May 1 to 23, June 25 to September 30, 1920; when gage was read on an average of twice weekly. Results good for 1919 and fair for 1920.

MONTHLY DISCHARGE OF LARAMIE RIVER NEAR WOODS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	68	26	52.7	3,240
April	345	60	130	7,740
May	640	194	391	24,000
June	412	63	223	13,300
July	71	6	27.8	1,710
August	111	8	21.1	1,300
September	40	4	17.5	1,040
1920				
May 4-31	1,920	314	956	53,100
June	2,100	680	1,310	78,000
July	680	55	197	12,100
August	121	9	59.3	3,650
September	87	46	60.8	3,620
The period	....	....	....	150,000

MONTHLY DISCHARGE OF PIONEER CANAL NEAR WOODS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April			4	238
May	148	2	72.2	4,440
June	94	52	68.5	4,080
July	65	34	48.1	2,960
August	62	20	36.1	2,220
September	31	2	20.9	1,240
The period				15,200
1920				
May	595	4	122	7,500
June	363	158	275	16,400
July	174	96	131	8,060
August	106	28	78.9	4,850
September	25	10	17.2	1,020
The period				37,800

MONTHLY DISCHARGE OF LARAMIE RIVER AND PIONEER CANAL NEAR WOODS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April			134	7,970
May	748	196	463	28 500
June	486	126	292	17,400
July	136	40	75.9	4,670
August	154	28	57.2	3.520
September	67	26	38.4	2,280
The period				64,300
1920				
May	2,230	318	1 080	66,400
June	2,440	857	1,580	94,000
July	854	151	328	20,200
August	227	79	138	8,480
September	104	56	78	4,640
The period				194 000

LARAMIE RIVER AT TWO RIVERS

Location.—In sec. 5, T. 17 N., R. 74 W., at highway bridge at Two Rivers, in Albany County. Nearest tributary, Little Laramie River, enters one-fourth mile below.

Drainage area.—1,290 square miles.

Records available.—May 6, 1911, to October 31, 1912; October 1, 1913, to September 30, 1920. Station maintained by State engineer during 1913.

Gage.—Friez water-stage recorder on left bank installed May 2, 1920, 45 feet downstream from bridge and site of Bristol gage used from 1915 to 1919. Datum unchanged since 1915. Gage used in 1912 was referred to datum 0.74 foot lower. Gage on left bank 400 feet above bridge used during 1913 and 1914.

Diversions.—By decree of district court dated December 27, 1912, adjudicated diversions of 414 second-feet from Laramie River between this and the station near Woods.

Accuracy.—Gage heights from staff gage readings three times weekly during 1919, and from continuous record during 1920; rating curve well defined. Results fair for 1919 and excellent for 1920.

MONTHLY DISCHARGE OF LARAMIE RIVER AT TWO RIVERS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
July 16-31	13	5	7.8	247
August	24	2	6.7	412
September	7	2	4.5	268
1920				
May	1,350	132	499	30,700
June	2,030	605	1,260	75,000
July	535	74	207	12,700
August	120	63	84	5,160
September	121	55	83	4,940
The period				128,000

LARAMIE RIVER AT FORT LARAMIE

Location.—At highway bridge in sec. 28, T. 26 N., R. 64 W., at Fort Laramie, in Goshen County. No tributary of importance between station and mouth, 1½ miles below.

Drainage area.—4,580 square miles.

Records available.—April 4, 1915, to September 30, 1920.

Gage.—Vertical staff.

Diversions.—By decree of district court dated December 27, 1912, there are adjudicated diversions of 61 second-feet between station below McGill and Fort Laramie.

Regulation.—Flow regulated by Wheatland reservoir located 70 miles upstream in main channel of river, and having a capacity of 110,000 acre-feet. Stored water from reservoir diverted from river a few miles below reservoir.

Cooperation.—Complete records furnished by U. S. Reclamation Service.

MONTHLY DISCHARGE OF LARAMIE RIVER AT FORT LARAMIE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1919				
April	313	120	231	13,700
May	238	16	89.7	5,520
June	91	12	23.9	1,420
July	820	12	69.6	4,280
August	16	10	12.3	756
September	35	10	20.0	1,190
The period				26,900
1920				
May	1,520	425	1,030	63,300
June	1,550	425	858	51,100
July	365	66	185	11,400
August	227	66	105	6,460
September	192	76	123	7,320
The period				140,000

LITTLE LARAMIE RIVER NEAR FILMORE

Location.—In sec. 9, T. 15 N., R. 77 W., at private bridge at May's ranch, 1½ miles south of Filmore, in Albany County. No tributary of importance between station and junction of North, Middle and South forks, 4 miles above.

Drainage area.—155 square miles.

Records available.—May 14, 1911, to October 31, 1912; April 1, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Vertical staff read by Claude May; located at downstream end of left bridge abutment. Gage used since April 1, 1915, was referred to datum 0.21 foot lower than gage at same location used during 1911 and 1912.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 43 second-feet from the Little Laramie above station and 255 second-feet from tributaries entering above.

Accuracy.—Gage read twice daily, rating curve well defined; results excellent.

MONTHLY DISCHARGE OF LITTLE LARAMIE RIVER NEAR FILMORE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	59	28	38.1	2,340
November 1-7	34	30	32.0	444
April	94	21	50.5	3,000
May	832	80	305	18,800
June	365	87	187	11,100
July	148	24	52 7	3 240
August	148	8	26.5	1,630
September	13	7	9.5	565
1919-20				
October	39	9	17.9	1 100
November 1-15	14	5	10.5	312
April	87	22	50.7	3,020
May	1,070	87	280	17 200
June	1,520	460	929	55,300
July	344	87	182	11,200
August	128	50	87.0	5,350
September	70	33	43.7	2 600

LITTLE LARAMIE RIVER AT TWO RIVERS

Location.—On line between secs. 5 and 6, T. 17 N., R. 74 W., at highway bridge half a mile south of Two Rivers, in Albany County. No tributary between station and mouth, half a mile below.

Drainage area.—310 square miles.

Records available.—May 6, 1911, to October 31, 1912; October 1, 1913, to September 30, 1920. State engineer maintained station at this point during 1913.

Gage.—Bristol water-stage recorder located at bridge. Gage used during 1913 and 1914 was located 400 feet downstream and referred to different datum.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions from Little Laramie River of 422 second-feet between Filmore and Two Rivers stations.

Accuracy.—Gage heights from continuous record which was not entirely satisfactory; rating curve well defined. Results fair.

MONTHLY DISCHARGE OF LITTLE LARAMIE RIVER AT TWO RIVERS, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October 1-16	9.4	4.6	6.40	203
April	102	10	62.3	3,710
May 1-11	47	24	35.7	780
June 9-30	41	11	20.6	899
July	9.2	0	1.45	89
1920				
May	290	33	76.3	4,690
June	1,180	195	558	33,200
July	155	27	53.6	3,300
August	63	32	44.7	2,750
September	40	4	18.3	1,090
The period				45,000

NORTH LARAMIE RIVER NEAR WHEATLAND

Location.—In sec. 2, T. 25 N., R. 70 W., one-fourth mile above headgate of North Laramie Land Company's ditch, and 18 miles northwest of Wheatland, in Platte County. No tributary of importance within 10 miles of station.

Drainage area.—366 square miles.

Records available.—November 6, 1914, to September 30, 1920.

Gage.—Stevens water-stage recorder, located at left bank on vertical cliff just below proposed dam site.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 37 second-feet from North Laramie River above station, and 27 second-feet below.

Accuracy.—Gage heights from continuous records except for short periods; rating curve well defined. Results good except during periods of missing gage heights, for which they are fair.

MONTHLY DISCHARGE OF NORTH LARAMIE RIVER NEAR WHEATLAND, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	35	7.0	10.7	658
November 1-23	13	6 2	9.28	423
April 14-30	152	35	81.4	2,740
May	110	17	51.7	3,180
June	24	2	12.6	750
1919-20				
November 18-25	6	4	5.0	79
March 17-31	100	16	38.0	1,130
April	2,860	12	368	21,900
May	955	275	616	37,900
June	245	36	92.8	5,520
July	63	21	26.1	1,600
August	40	15	20.4	1,250
September	15	7	10.4	619

NOTE.—Practically no flow after June 30, 1919.

CHUGWATER CREEK AT CHUGWATER

Location.—In sec. 31, T. 21 N., R. 66 W., 300 feet above highway bridge half a mile from railroad station at Chugwater, in Platte County. No tributary within several miles.

Drainage area.—359 square miles.

Records available.—May 22, 1911, to November 6, 1912; January 1, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Chain gage read by C. D. Smith; located at left bank 300 feet above bridge, installed April 6, 1916, at same datum and location as vertical staff used previously. Prior to February 6, 1912, gage was located on bridge and referred to different datum.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions from Chugwater Creek of 73 second-feet above station, and 98 second-feet below.

Accuracy.—Gage read twice daily; rating curve well defined. Results good.

MONTHLY DISCHARGE OF CHUGWATER CREEK AT CHUGWATER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	15	12	13.3	818
November	17	6.9	13.4	797
December	19	7.0	10.6	652
January	14	6.8	9.75	600
February	14	6.4	9.83	546
March	28	7.4	17.7	1,090
April	53	18	35.3	2,100
May	14	3.4	6.78	417
June	4.1	2.7	3.30	196
July	26	2.3	4.95	304
August	74	2.5	5.66	348
September	52	2.7	5.54	330
The year	74	2.3	11.3	8,200
1919-20				
October	5.9	3.1	4.72	290
November	5.9	3.1	4.21	251
December	3.8	1.2	2.70	166
January	8.6	2.7	3.84	236
February	13	5.2	8.96	515
March	12	3.0	8.83	543
April	66	3.5	24.8	1,480
May	215	42	120	7,380
June	80	8.3	21.7	1,290
July	52	6.4	15.2	935
August	257	12	32.4	1,990
September	29	13	18.7	1,110
The year	257	1.2	22.3	16,200

HORSE CREEK NEAR LAGRANGE

Location.—In the SW¼ of SW¼, sec. 34, T. 20 N., R. 61 W., two miles southeast of Wye-Cross ranch and 1½ miles northwest of Lagrange, in Goshen County. Nearest tributary, Bear Creek, enters two miles below.

Drainage area.—683 square miles.

Records available.—November 1, 1915, to April 4, 1920; from December 1, 1911, to December 31, 1912, fragmentary records are available at a point 1¼ miles downstream.

Gage.—Gurley water-stage recorder, located at left bank 200 yards below Sherrod's ranch house.

Diversions.—Prior to July 1, 1919, there were adjudicated permits for diversions of 1,176 second-feet from Horse Creek above station and 84 second-feet below.

Accuracy.—Gage heights from continuous record, except for short periods; rating curves well defined. Results good except for periods of missing gage heights and periods affected by ice, for which they are fair.

MONTHLY DISCHARGE OF HORSE CREEK NEAR LAGRANGE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	50	44	46.8	2,880
November	56	20	44.2	2,630
December 1-14	57	35	48.0	1,330
February	58	25	43.3	2,400
March	58	29	49.7	3,060
April	64	38	52.5	3,120
May	34	7	12.9	793
June 1-14	12	10	10.7	297
1919-20				
November 1-10	23	7	11.8	234
January	62	30	48.0	2,950
February	55	29	43.2	2,480
March	64	40	48.3	2,970

GREEN RIVER BASIN

GREEN RIVER NEAR DANIEL

Location.—Near line between Ts. 32 and 33 N., R. 110 W., at highway bridge 6 miles southwest of Daniel, in Fremont County. No tributary of importance within several miles.

Drainage area.—932 square miles.

Records available.—April 1, 1915, to September 30, 1920. State engineer maintained station at this point during 1913 and 1914.

Gage.—Chain gage read by Mrs. A. P. Sommers; located on downstream side of bridge.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 241 second-feet from Green River above station near Daniel.

Accuracy.—Gage read once daily; rating curve well defined. Results good except during May, 1920, when they appear to be 25 per cent too large, as shown by comparison with other stations in Green River basin.

MONTHLY DISCHARGE OF GREEN RIVER NEAR DANIEL, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	530	310	387	23,800
November 1-23	310	136	218	9,950
April	1,250	300	734	43,700
May	2,280	385	929	57,100
June	2,620	400	771	45,900
July	478	238	316	19,400
August	498	254	361	22,200
September	530	254	406	24,200
1919-20				
October	491	200	311	19,100
May	2,980	465	1,870	115,000
June	2,980	1,640	2,320	138,000
July	2,280	1,500	1,990	122,000
August	1,500	530	1,020	62,700
September	530	320	419	24,900

GREEN RIVER AT GREEN RIVER

Location.—At highway bridge one-quarter mile south of the railroad station at Green River, in Sweetwater County. No tributary within several miles.

Drainage area.—7,670 square miles.

Records available.—May 2, 1895, to October 31, 1906; March 1, 1915, to September 30, 1920.

Gage.—Chain gage read by W. S. Moorehouse. Located on upstream side of left channel span. From 1895 to 1906 a vertical staff was attached to submerged cribbing on the east bank of the river near the pump house one-third mile above present location. No determined relation between gages.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 221 second-feet from Green River between Daniel and Green River stations.

Accuracy.—Gage read once daily; rating curve for 1919 well defined. Results good. In spring of 1920, a log boom constructed below station caused backwater of varying amounts as shown by discharge measurements. Corrections for backwater applied to gage heights but these are somewhat uncertain. Results for 1920 fair.

MONTHLY DISCHARGE OF GREEN RIVER AT GREEN RIVER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	....	....	900	55,300
November	1,130	410	749	44,600
December	....	....	449	27,600
January	....	....	358	22,000
February	....	....	346	19,200
March	1,640	350	655	40,300
April	2,120	890	1,600	95,200
May	5,100	1,420	2,580	159,000
June	8,050	890	2,140	127,000
July	890	350	542	33 300
August	715	330	523	32,200
September	750	330	499	29,700
The year	8,050	....	946	685,000
1919-20				
October	925	460	724	44,500
November 1-20	960	410	670	26,600
March	1,420	680	935	57,500
April	4,030	820	1,710	102,000
May	9,190	1,220	4,390	270,000
June	12,300	4.720	8,690	517,000
July	6,200	2,250	4,050	249,000
August	2,200	890	1,450	89.200
September	890	680	873	51,900

COTTONWOOD CREEK NEAR BIG PINEY

Location.—About in sec. 21, T. 32 N., R. 111 W., at highway bridge near Hayden's ranch, 16 miles north of Big Piney, in Lincoln County.

Drainage area.—241 square miles.

Records available.—April 25, 1916, to September 30, 1919.

Gage.—Creek flows in two channels one mile apart; vertical staff on North Channel and Stevens water-stage recorder on South Channel at highway bridge; read by M. G. Dunham.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 48 second-feet from Cottonwood Creek above station, and 52 second-feet below.

Accuracy.—(North Channel) Gage read twice daily; rating curve well defined. Results excellent. (South Channel) Gage heights from continuous records; rating curve well defined. Results excellent.

MONTHLY DISCHARGE OF NORTH CHANNEL OF COTTONWOOD CREEK NEAR BIG PINEY, FOR THE YEARS ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	32	19	28.5	1,750
November 1-13	32	23	29.1	751
April	244	42	121	7.200
May	39	5	20.2	1,240
June	42	1.5	12.6	750
July	42	.5	18.6	1,140
August	10	0	1.86	114
September	0	0	0	0

MONTHLY DISCHARGE OF SOUTH CHANNEL OF COTTONWOOD CREEK NEAR BIG PINEY, FOR THE YEARS ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	23	15	18.6	1,140
November 1-13	24	18	20.4	526
April 14-30	62	45	51.6	1,740
May 1-12	44	17	24.8	590
June	18	1.0	9.34	556
July	7.5	0	2.50	154
August	2.6	0	.88	54
September 1-9	2.2	0	1.02	18

EAST FORK AT NEWFORK

Location.—About sec. 33, T. 32 N., R. 108 W., at highway bridge one-quarter mile south of Newfork, in Fremont County. No tributary between station and mouth one mile below.

Drainage area.—348 square miles.

Records available.—April 1, 1905, to October 31, 1906; May 11, 1915, to September 30, 1920.

Gage.—Vertical staff read by Mrs. J. Ball and J. W. Glaze; located on downstream side of left abutment. Gage used during 1905 was located one-quarter mile upstream; 1906 gage located at bridge, and referred to datum 0.27 foot higher than present gage.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 143 second-feet from East Fork, all above station.

Regulation.—Flow of East Fork regulated to limited extent by many small lakes at headwaters.

Accuracy.—Gage read twice daily; rating curves well defined. Results excellent except period June 11 to 25, 1920, when affected by backwater from New Fork, for which they are good.

MONTHLY DISCHARGE OF EAST FORK AT NEWFORK, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	82	58	68.5	4,210
November	75	40	61.4	3,650
September 11-30	46	36	37.6	1,490
1919-20				
October	53	40	45.9	2,820
November 1-8	49	39	45.0	714
April	400	25	95.8	5,700
May	2,130	63	583	35,800
June	2,320	262	1,050	62 500
July	351	57	120	7,380
August	66	57	58.4	3,590
September	57	54	55.1	3,280

NEW FORK NEAR BOULDER

Location.—About sec. 8, T. 32 N., R. 108 W., at highway bridge one mile west of Boulder, in Fremont County. Nearest tributary, which is Boulder Creek, enters one-eighth mile below.

Drainage area.—578 square miles.

Records available.—May 11, 1915, to September 30, 1920.

Gage.—Vertical staff read by J. O. Orcutt and Miss Tula Brandt; located at downstream side of left abutment.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 191 second-feet from New Fork above station.

Accuracy.—Gage read twice daily; rating curves fairly well defined. Results good except for periods affected by ice, for which they are fair.

MONTHLY DISCHARGE OF NEW FORK NEAR BOULDER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	294	148	240	14,800
November	216	99	154	9,160
April	160	117	128	7,620
May	2,200	160	667	41,000
June	1,900	230	613	36,500
July	206	68	110	6,760
August	107	64	80.0	4,920
September	107	64	91.9	5,470
1919-20				
October	174	125	140	8,610
November	154	100	134	7,970
May 20-31	1,190	535	897	21,400
June	2,950	980	2,260	134,000
July	2,100	680	1,320	81,200
August	680	242	432	26,600
September	231	151	200	11,900

PINE CREEK AT PINEDALE.

Location.—In sec. 4, T. 33 N., R. 109 W., at highway bridge at Pinedale, in Fremont County. No tributary of importance between station and mouth 3 miles below.

Drainage area.—128 square miles.

Records available.—May 8, 1915, to September 30, 1920.

Gage.—Vertical staff located on downstream side of bridge pier; read by U. S. Forest Service. Prior to August 17, 1917, vertical staff located one-quarter mile below gage on left bank, was used.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 73 second-feet from Pine Creek between stations at Fremont Lake outlet and Pinedale, and 4 second-feet below Pinedale.

Accuracy.—Gage read twice daily except during September, 1920; rating curve well defined. Results excellent except during winter period, for which they are fair.

MONTHLY DISCHARGE OF PINE CREEK AT PINEDALE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	102	50	79.9	4,910
November	71	40	53.5	3,180
December 1-8	43	32	35.9	570
April	32	19	21.6	1,290
May	1,050	20	258	15,900
June	910	97	314	18,700
July	85	20	34.9	2,150
August	45	26	33.5	2,060
September	60	32	50.1	2,980
1919-20				
October	62	50	57.5	3 540
November			50.3	2 990
December			46.6	2 870
January			37.2	2,290
February	50	25	34.3	1,970
March	26	25	25.2	1.550
April	37	25	32.1	1,910
May	270	37	101	6,210
June	1,040	320	788	46,900
July	900	320	663	40,800
August	320	85	161	9,900
September	91	45	66.4	3,950
The year	1,040		172	125,000

BOULDER CREEK NEAR BOULDER.

Location.—In sec. 4, T. 32 N., R. 108 W., at Sandlin ranch 2 miles northwest of Boulder, in Fremont County. No tributary between station and mouth, 2 miles below.

Drainage area.—112 square miles.

Records available.—April 23, 1904, to October 31, 1906; May 10, 1915, to September 30, 1920.

Gage.—Chain gage installed May 19, 1920, at point in slough 50 feet upstream from vertical staff located 60 feet northwest of ranch house used prior to that date, and referred to the same datum; read by Mrs. M. M. Sandlin. Gage used 1904-1906 was located a short distance upstream.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 83 second-feet from Boulder Creek, all above the station.

Accuracy.—Gage read twice daily; rating curve well defined. Results good.

MONTHLY DISCHARGE OF BOULDER CREEK NEAR BOULDER, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	63	5	27.5	1,690
November 1-21	51	22	36.6	1,520
March 23-31	21	18	19.6	350
April	82	4	32.7	1,950
May	1,900	54	551	33,900
June	700	25	178	10,600
July	25	6	9.4	578
August	6	3	3.7	228
September	3	3	3.0	179
1919-20				
October	69	4	49.8	3,060
November	68	40	55.0	3,270
April 14-30	95	82	85.3	2,880
May	1,160	87	339	20,800
June	1,880	490	1,140	67,800
July	700	90	313	19,200
August	81	16	35.5	2 180
September	16	9	11.1	660

FONTENELLE CREEK NEAR FONTENELLE

Location.—About sec. 3, T. 24 N., R. 113 W., at bridge at Holden's ranch on stage road from Opal to Big Piney, and 5 miles west of Fontenelle, Lincoln County. No important tributary between station and mouth.

Drainage area.—224 square miles (measured on special map in Bulletin 543, U. S. G. S.).

Records available.—May 16, 1915, to September 30, 1919. State engineer maintained station at this point during 1914.

Gage.—Vertical staff read by Alfred Weber and Glen Fredrick; located at downstream end of right abutment.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 77 second-feet from Fontenelle Creek; percentage above station not known.

Accuracy.—Gage read once daily, rating curve well defined; results good.

MONTHLY DISCHARGE OF FONTENELLE CREEK AT FONTENELLE, FOR THE YEAR ENDING SEPTEMBER 30, 1919.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	66	40	47.4	2,910
November 1-20	47	36	42.7	1,690
April	138	28	79.7	4,740
May	132	74	97.7	6,010
June	74	8	27.2	1,620
July	....	....	5.0	307
August	25	1	18.6	1,140
September	20	1	13.6	809

BLACKS FORK NEAR URIE.

Location.—In sec. 23, T. 16 N., R. 115 W., at highway bridge, 4 miles northwest of Urie, in Uinta County. No tributary within 10 miles.

Drainage area.—261 square miles.

Records available.—August 21, 1913, to September 30, 1920.

Gage.—Vertical staff read by Mary Anderson; located on downstream side of center pier. August 19, 1915, datum lowered 0.50 foot to avoid negative readings.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 621 second-feet from Blacks Fork above station, and 4 second-feet below.

Accuracy.—Gage read twice daily; rating curves well defined, except during period May 18 to June 22, 1920, when the control shifted. Results good except during period of shifting control and latter part of 1920 when uncertainty in gage heights make them fair.

MONTHLY DISCHARGE OF BLACKS FORK NEAR URIE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	45	10	19.4	1,190
November 1-23	25	7	11.6	529
March 23-31	61	44	51.6	921
April	46	14	21.0	1,250
May	680	27	309	19,000
June	108	6.0	31.0	1,840
July	8.0	1.8	4.28	263
August	6.8	2.2	3.99	245
September	6.0	3.0	4.19	249
1919-20				
October	13	6	10.0	615
November 1-15	13	10	10.2	303
March 20-31	101	44	64.3	1,530
April	206	44	102	6,070
May	1,220	101	535	32,900
June	1,130	52	393	23,400
July	30	15	19.3	1,190
August	32	5	16.3	1,000
September	20	8	14.2	845

HAMS FORK AT DIAMONDVILLE.

Location.—In SW. ¼ sec. 24, T. 21 N., R. 116 W., at highway bridge at Diamondville, in Lincoln County. .Nearest tributary, Willow Creek, enters 4 miles upstream.

Drainage area.—383 square miles.

Records available.—October 1, 1918, to September 30, 1920. From May 1 to September 30, 1918, station maintained at Kemmerer, 2 miles upstream; records at two points comparable.

Gage.—Vertical staff fastened to downstream end of center pier; read by H. V. Collins.

Diversions.—Prior to July 1, 1919, adjudicated diversions of 48 second-feet from Hams Fork above station and 112 second-feet below.

Accuracy.—Gage read twice daily; rating curves well defined. Results excellent.

MONTHLY DISCHARGE OF HAMS FORK AT DIAMONDVILLE, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	45	32	39.4	2,420
November 1-21	43	30	33.1	1,380
April	560	55	276	16,400
May	560	294	385	23,700
June	405	27	123	7,320
July	25	5	10.3	633
August	18	0	10.5	646
September	23	1	13.3	791
1919-20				
October	47	26	34.2	2,100
November	43	33	37.6	2,240
December 1-13	44	33	39.2	1,010
March 14-31	57	38	46.7	1,670
April	405	35	147	8,750
May	2,640	480	1,420	87,300
June	1,380	280	698	41,500
July	241	45	86.6	5,320
August	53	26	38.3	2,360
September	49	26	33.9	2,020

LITTLE SNAKE RIVER BASIN

LITTLE SNAKE RIVER NEAR DIXON.

Location—In sec. 6, T. 12 N., R. 90 W., at highway bridge, one mile west of Dixon, in Carbon County. No important tributary within several miles.

Drainage area.—1060 square miles.

Records available.—May 27, 1910, to September 30, 1920.

Gage.—Chain gage read by Miss Edith Madsen; located on bridge.

Cooperation.—Complete records furnished by State engineer of Colorado.

MONTHLY DISCHARGE OF LITTLE SNAKE RIVER NEAR DIXON, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	381	60	105	6,460
November 1-24	170	96	134	6,380
March 23-31	1,960	702	1,340	23,900
April	3,960	411	1,700	101,000
May	3,420	2,310	2,910	179,000
June	2,510	133	1,020	60,700
July	161	5	31.9	1,960
August	43	5	10.9	670
September	170	6	17.5	1,040
1919-20				
October	337	66	134	8,240
November 1-15	147	124	135	4,020
April	1,180	155	512	30,500
May	8,960	860	5,700	350,000
June	6,840	1,060	3,630	216.000
July	1,230	100	330	20,300
August	112	56	75.5	4,640
September	190	66	94.7	2,840

SAVERY CREEK AT SAVERY.

Location.—About in sec. 8, T. 12 N., R. 89 W., half a mile east of Savery, in Carbon County. No tributary between station and mouth, 1½ miles below.

Drainage area.—354 square miles.

Records available.—May 1, 1915, to September 30, 1916; April 5, 1918, to September 30, 1920.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 64 second-feet from Savery Creek.

Regulation.—None.

Cooperation.—Complete records furnished by State engineer of Colorado.

MONTHLY DISCHARGE OF SAVERY CREEK AT SAVERY, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	63	18	30.8	1,890
November 1-21	79	24	50.0	2,080
March 27-31	870	790	834	8,280
April	870	111	507	30,200
May	630	190	362	22,300
June	254	2	94.4	5,620
July	3	0	1.50	92
August	0	0	0	0
September	6	0	.02	12
1919-20				
October	140	18	52.3	3,220
November	50	18	33.8	2,010
April 9-30	650	72	213	9,290
May	1,770	434	1,180	72,600
June	908	50	353	21,000
July	60	4	11.0	676
August	13	2	5.0	307
September	40	3	12.6	750

BEAR RIVER BASIN

BEAR RIVER NEAR EVANSTON.

Location.—In sec. 1, T. 15 N., R. 121 W., 300 feet above highway bridge, and 3½ miles northwest of Evanston, Uinta County. Nearest tributary a small stream entering from the southwest one-half mile above.

Drainage area.—645 square miles.

Records available —October 26, 1913, to September 30, 1920.

Gage.—Chain gage read by Mrs. Alex. Morrow; located on left bank 300 feet above bridge.

Diversions.—Prior to July 1, 1919, there were adjudicated diversions of 381 second-feet from Bear River above station. Below, diversion of 390 second-feet.

Accuracy.—Stage-discharge relation shifting at long intervals; affected by ice during winter months. Rating curve well defined between 25 and 1,700 second-feet. Gage read to hundredths twice daily. Results excellent.

MONTHLY DISCHARGE OF BEAR RIVER NEAR EVANSTON, FOR THE YEARS ENDING SEPTEMBER 30, 1919-1920.

MONTH	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1918-19				
October	86	23	61.0	3,750
November 1-23	77	64	70.3	3 210
March 27-31	382	348	365	3,620
April	440	128	262	15,600
May	1,380	365	781	48,000
June	995	61	395	23,500
July	56	0.8	5.84	359
August	6.6	0.1	2.42	149
September	23	2.8	12.4	738
1919-20				
October	102	41	78.6	4,830
November	113	81	98.0	5,830
March 21-31	72	51	61.6	1,340
April	1,260	67	411	24,500
May	2,520	1,140	1,700	105.000
June	2,170	660	1,190	70,800
July	502	59	163	10,000
August	70	43	56.3	3.460
September	60	35	46.5	2,770

SEEPAGE AND RETURN WATER IN WYOMING STREAMS DURING 1920

SCOPE OF WORK

To determine the amount of return water in Wyoming streams used for irrigation, an investigation was undertaken during the summer of 1920 by the U. S. Geological Survey in cooperation with the State engineer, who furnished most of the funds for the work. The following streams, which are extensively used for irrigation, were selected:

- Big Horn Basin—
  - Owl Creek
  - No Wood Creek
    - Tensleep Creek
    - Paintrock Creek
      - Medicine Lodge Creek
  - Shell Creek
  - Greybull River
    - Wood River
- Northeastern Section—
  - Little Goose Creek
  - Clear Creek
    - Rock Creek
    - French Creek
    - Piney Creek

The work was started July 21st, as soon as the streams had reached a comparatively steady flow for the daily period, and continued until September 21st, near the end of the irrigation season. On most of the streams two sets of measurements were made, the first set during the period July 21st to August 18th, when the greater part of the land was being irrigated, and the second set during the period August 25th to September 21st, when many of the ditches were dry, although some land was being irrigated.

METHOD OF MEASUREMENT

The measurements were started either at the mouth of the canyon, or above practically all diversions, and carried to the mouth of each stream. By proceeding downstream, the effect of sudden rises due to storms in the mountains was partially if not wholly eliminated, as the work proceeded at a sufficiently rapid rate to keep ahead of such rises.*

The method employed was to divide each stream into sections from 3 to 5 miles in length. The flow at the two ends of the section was measured, as was that of all intervening diversions and tributaries. If no seepage gains or losses occurred in the section, the difference between inflow and diversions equalled the difference in stream flow at the two ends of the section. Where such gains or losses occurred, as was generally the case, the amount of such was shown by the difference between inflow and diversions as compared with difference in stream flow at the two ends of the section.

The larger streams, notably Greybull River, required several days to complete the measurements and on these the work each day was finished by measuring the river at the lower end of a section. The next day the work was started by measuring the river at the same point, which was taken as the upper end of the next section of river to be investigated. By measuring each day at the point where the previous day's work terminated, the effect of change in river stage during the night was eliminated to a large extent.

An attempt was made to measure the return water from the ditches and this was done wherever the waste water was sufficiently large to be noticed, but much of it was in such small quantities that it was impossible to detect it readily. The only reason for segregating this surface waste is that in dry years the duty of water becomes higher, thus reducing the surface waste, although the true seepage, or water returning underground, will probably not be so greatly affected. In presenting the results, both the seepage water and the return water, which is the sum of the seepage and surface waste water, are given.

PRESENTATION OF RESULTS

In the following tables are given first, a summary of the seepage water for each stream investigated, together with the total diversions from the stream at the time of measurement, and second, a summary of the return water with the total diversions. After these summaries, are given the general results for each stream, consisting of a summarized table showing the flow of the stream at each point measured, the total inflow and diversion for each section of the stream, the section gain or loss, and total gain or loss for seepage water and finally the cumulative return water (seepage and surface waste).

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*See footnote to Greybull measurements.

No attempt has been made to draw definite conclusions, as seepage investigations should be continued for a number of years to show conclusive results.

SUMMARY OF RESULTS OF SEEPAGE WATERS.

STREAM	First measurements July 21 to August 18		Second measurements August 25 to September 21	
	Diversions	Seepage gains	Seepage gains	Diversions
Big Horn Basin—	Second feet	Second-feet	Second-feet	Second-feet
Owl Creek	....	....	—7.8	12.0
No Wood Creek	47.3	+41.5	....	....
Tensleep Creek	57.6	—12.7	....	....
Paintrock Creek	110	—14.0	+17.3	52.1
Medicine Lodge Cr.	66.0	+24.7	+21.0	50.3
Shell Creek	138	+40.5	....	....
Greybull River	574	—30.7	+23.6	203
Wood River	27.4	+22.4	+30.2	32.3
Northeastern Section—				
Little Goose Creek	85.4	+56.9	+28.7	47.2
Clear Creek	126	+40.4	+14.3	38.1
Rock Creek	58.6	—0.3	+3.1	7.9
French Creek	68.7	+20.6	+4.2	12.0
Piney Creek*	56.3	+16.3	+4.3	20.9
North Piney Creek	97.6	+10.1	+0.1	28.4
South Piney Creek	115	+20.6	+10.5	38.8

*For comparison with results obtained by Leiter Estate, see p. 96.

SUMMARY OF RESULTS OF RETURN WATERS (SEEPAGE PLUS MEASURED SURFACE WASTE).

STREAM	First measurements July 21 to August 18, 1920		Second measurements August 25 to Sept. 21, 1920	
	Diversions	Return water	Return water	Diversions
Big Horn Basin—	Second feet	Second-feet	Second-feet	Second-feet
Owl Creek	....	....	—7.8	12.0
No Wood Creek	47.3	+41.5	....	....
Tensleep Creek	57.6	—12.7	....	....
Paintrock Creek	110	—14.0	+17.3	52.1
Medicine Lodge Cr.	66.0	+29.2	+25.1	50.3
Shell Creek*	138	+48.5	....	....
Greybull River	574	+20.4	+45.7	203
Wood River	27.4	+22.4	+30.2	32.3
Northeastern Section—				
Little Goose Creek	85.4	+56.9	+28.7	47.2
Clear Creek	126	+44.2	+17.5	38.1
Rock Creek	58.6	0.0	+3.6	7.9
French Creek	68.7	+23.7	+5.4	12.0
Piney Creek	56.3	+18.5	+5.3	20.9
North Piney Creek	97.6	+11.6	+1.1	28.4
South Piney Creek	115	+20.6	+11.5	38.8

*For comparison with results obtained 1918 and 1919, see p. 87.

OWL CREEK.

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
		Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
	North Fork of Owl Creek							
Sept. 6	North Fork at head of Basin ditch	0.0	3.9					
	North Fork at mouth	13.0	0.0		3.7	—0.2	—0.2	—0.2
	Owl Creek							
	South Fork at Anchor	0.0	8.9					
	South Fork below Short ditch	8.0	4.6	0.0	1.7	—2.6	—2.6	—2.6
	Owl Creek below Padlock middle ditch	17.0	8.1	7.2	2.0	—1.7	—4.3	—4.3
6	Owl Creek at Middleton	20.5	3.6	0.0	3.4	—1.1	—5.4	—5.4
7	do	20.5	3.8					
	Owl Creek 1 mile below Mud Creek	30.0	4.6	3.4	1.1	—1.5	—6.9	—6.9
	Owl Creek below Dempsey ditch	34.0	1.2	0.0	2.8	—0.6	—7.5	—7.5
7	Owl Creek at mouth	38.0	0.1	0.0	1.0	—0.1	—7.8	—7.8

NO WOOD CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
		Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 27	No Wood Creek below Tensleep Creek	0.0	182.0					
	No Wood Creek at county line	16.0	185.6	0.0	26.7	+30.3	+30.3	+30.3
27	No Wood creek at Bonanza	19.5	280.9	99.2	0.0	—3.9	+26.4	+26.4
28	do	19.5	245.0					
28	No Wood creek at mouth	33.5	239.4	0.0	20.7	+15.1	+41.5	+41.5

TENSLEEP CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
		Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 26	Tensleep Creek at mouth of canyon	0.0	222.6					
	Tensleep Creek below Bay State No. 1 ditch	2.5	164.2	0.0	39.2	—19.2	—19.2	—19.2
	Tensleep Creek at mouth	6.0	152.3	0.0	18.4	+6.5	—12.7	—12.7

PAINTROCK CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	July 23-24, 1920	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 23	Paintrock Cr. at mouth of canyon	0.0	272.7					
23	Paintrock Cr. above Medicine Lodge Cr.	6.5	166.2	0.0	92.0	—14.5	—14.5	—14.5
24	do	6.5	159.6					
24	Paintrock Cr. at mouth	13.5	146.7	4.9	18.3	+0.5	—14.0	—14.0
	August 24-25, 1920							
Aug. 24	Paintrock Cr. at mouth of canyon	0.0	62.0					
	Paintrock Cr. above Military Creek	3.5	27.5	0.0	31.1	—3.4	—3.4	—3.4
24	Paintrock Cr. below Medicine Lodge Cr.	6.5	30.3	4.0	8 3	+7.1	+3.7	+3.7
25	Paintrock Cr. below W. M. & M. ditch	10.0	33.2	2.8	9.7	+9.8	+13.5	+13.5
	Paintrock Cr. at mouth	13.5	34.0	0.0	3.0	+3.8	+17.3	+17.3

MEDICINE LODGE CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	July 21-22, 1920.	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 21	Medicine Lodge Cr. at mouth of canyon	0 0	37.3					
21	Medicine Lodge Cr. above Gotwahl ditch	2.0	36.8	0.0	5.3	+4.3	+4.3	+4.3
22	Medicine Lodge Cr. below Mercer ditch	3.7	15.7	4.2	44 8	+19.5	+23.8	+28.0
22	Medicine Lodge Cr. at mouth	6.1	1.2	0.5	15.9	+0.9	+24.7	+29.2
	August 25, 1920.							
	Medicine Lodge Cr. above Anthony ditch	0.0	20.0					
	Medicine Lodge Cr. below Gotwahl ditch	1.5	33.4	2.7	2 3	+13.0	+13.0	+15.7
	Medicine Lodge Cr. below Mercer ditch	3.2	12.6	7.4	34.7	+6.5	+19.5	+23.6
	Medicine Lodge Cr. at mouth	5.6	1.0	0.2	13.3	+1.5	+21.0	+25.1

SHELL CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
		Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 22	Shell Creek at mouth of canyon	0.0	134.8					
	Shell Creek above Shell Canal	3.6	139.6	8.6	17.2	+13.4	+13.4	+13.4
22	Shell Creek below Whaley ditch	6.5	46.2	2.0	99.4	+4.0	+17.4	+18.9
23	Shell Creek below Porter ditch	9.5	32.7	0.8	24.8	+10.5	+27.9	+29.4
	Shell Creek below Odessa ditch	12.8	44.2	0.0	4.5	+16.0	+43.9	+45.4
23	Shell Creek below Denny ditch	15.9	40.6	1.0	4.2	−0.4	+43.5	+46.0
24	do	15.9	37.1					
24	Shell Creek at mouth	20.4	34.3	5.5	5.3	−3.0	+40.5	+48.5

During 1918 and 1919 four sets of measurements of Shell Creek were made by the Wyoming Irrigation Company. The results of these measurements are given in the following table, together with those of the 1920 measurements. As the surface waste was not measured in the earlier investigations, these results represent return water, and are compared with the return water measured in 1920.

COMPARISON OF RESULTS ON SHELL CREEK

SECTION OF CREEK	Length of section	Gain or loss in second-feet				
		Aug. 15, 16, 1918	Sept. 1, 1918	June 30 to July 1, 1919	July 29, 1919	July 23, 24, 1920
	Miles					
Mouth of canyon to gaging station (sec. 26, T. 53 N., R. 91 W.)	3.6					+13.4
Gaging station to Whaley ditch	2.9	+1.0	+7.7	+18.5	+7.3	+5.5
Whaley ditch to Porter ditch	3.0	+13.7	+15.4	+12.2	+7.5	+10.5
Porter ditch to Odessa ditch	3.3	+26.4	+19.4	+9.0	+9.3	+16.0
Odessa ditch to Denny ditch	3.1					+.6
Odessa ditch to Dunshee ditch	4.0	+3.9	+11.3	+4.2	−1.8	
Denny ditch to mouth	4.5					+2.5
Dunshee ditch to mouth	3.0	+1.6	−3.7	−1.5	−2.5	
Total gain or loss	20.4	+46.6	+50.1	+42.4	+19.8	+48.5
Total diversions		103.4	121.7	111.7	80.8	155.4
Seepage percentage of diversions		45	41	36	24	31

GREYBULL RIVER

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in river	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	August 2-6, 1920.	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
Aug. 2	Greybull River above Otto Franc ditch (sec. 19, T. 48 N., R. 102 W.)	0.0	337.6					
	Greybull River below Pawpaw Creek (sec. 26, T. 48 N., R. 102 W.)	4.8	339.4	10.3	37.8	+29.3	+29.3	+29 3
	Greybull River above Wood River (sec. 22, T. 48 N., R. 101 W.)	10.2	316.2	5.7	3.4	—25.5	+3.8	+3.8
	Greybull River below Rocky ditch (sec. 24, T. 48 N., R. 101 W.)	12.1	484.0	186.8	5.3	—13.7	—9.9	—9.9
2	Greybull River at Meeteetse	15 7	505.4	0 0	15.3	+36.7	+26.8	+26.8
3	do	15.7	529.2					
	Greybull River above Winkle and Benbeck ditch (sec. 13. T. 49 N., R 100 W.)	20 6	529.6	4 3	6.4	+2.5	+29.3	+29.7
	Greybull River below Arnold ditch (sec. 22, T. 50 N., R. 99 W.)	26.9	523 1	0.0	39.5	+33 0	+62.3	+62.7
3	Greybull River below Meyer ditch (sec. 6, T. 50 N., R. 98 W.)	31.2	423.7	0.0	41.9	—57.5	+4.8	+5.2
4	do	31 2	572.2					
4	Greybull River above Smith ditch (sec. 22, T. 51 N., R. 98 W.)	36.2	478.3	10.4	68.4	—35.9	—31.1	—20.3
5	do	38 2	376.5					
	Greybull River below German ditch (sec. 8, T. 51 N., R. 97 W.)	40.8	365.8	15.0	63.6	+37.9	+6.8	+32.6
	Greybull River below Erickson ditch (sec. 17, T. 51 N., R. 96 W.)	45 3	194.0	12.8	154.1	—29.9	—23.1	+14.9
5	Greybull River below Fairview ditch (sec. 15, T. 51 N., R. 96 W.)	49.2	137.3	0 0	49.1	—7.6	—30.7	+7.3
6	do	49 2	108.5					
	Greybull River at Otto bridge (sec. 22, T. 51 N., R. 95 W.)	54 2	70.4	8 5	46.3	—0.3	—31.0	+15.5
	Greybull River at lower bridge (Sec. 7, T. 51 N., R. 94 W.)	58.1	62.5	0 0	24.3	+16.4	—14.6	+31.9
	Greybull River at Skovgard's ranch (sec. 36, T. 52 N., R. 94 W.)	61 3	47.8	1.0	14.9	—0.8	—15.4	+31.1
6	Greybull River at mouth	66.0	33.7	4.6	3.4	—15.3	—30.7	+20.4

GREYBULL RIVER—Continued

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	August 30-September 2, 1920.							
Aug. 30	Greybull River above Otto Franc ditch (sec. 19, T. 48 N., R. 102 W.)	0.0	94.1					
	Greybull River below Pawpaw Creek (sec. 26, T. 48 N., R. 102 W.)	4.8	104.1	9.1	12.8	+13.7	+13.7	+13.7
	Greybull River above Wood River (sec. 22, T. 48 N., R. 101 W.)	10.2	111.4	6.6	4.2	+4.9	+18.6	+22.9
	Greybull River below Rocky ditch (sec. 24, T. 48 N., R. 101 W.)	12.1	171.8	68.2	4.1	—3.7	+14.9	+19.2
30	Greybull River at Meeteetse	15.7	176.8	0.0	8.3	+13.3	+28.2	+32.5
31	do	15.7	176.8					
	Greybull River above Winkle & Benbeck ditch (sec. 13, T. 49 N., R. 100 W.)	20.6	176.6	0.2	5.0	+4.6	+32.8	+37.1
31	Greybull River below Dodge ditch (sec. 32, T. 50 N., R. 99 W.)	23.6	139.3	0.0	16.4	—20.9	+11.9	+16.2
Sept. 1	do	23.6	138.0					
	Greybull River below Meyer ditch (sec. 6, T. 50 N., R. 98 W.)	31.2	133.0	0.0	13.2	+8.2	+20.1	+24.4
	Greybull River above Smith ditch (sec. 22, T. 51 N., R. 98 W.)	36.2	109.2	0.2	22.9	—1.1	+19.0	+23.5
1	Greybull River below Bench canal (sec. 7, T. 57 N., R. 97 W.)	39.5	34.2	0.0	72.6	—2.4	+16.6	+21.1
2	do	39.5	34.0					
	Greybull River above Goodrich ditch (sec. 2, T. 51 N., R. 97 W.)	43.1	23.2	0.0	10.0	—0.8	+15.8	+20.3
	Greybull River below Burlington bridge (sec. 17, T. 51 N., R. 96 W.)	45.3	19.6	0.0	4.1	+0.5	+16.3	+20.8
	Greybull River below Fairview ditch (sec. 15, T. 51 N., R. 96 W.)	49.2	14.3	0.0	12.2	+6.9	+23.2	+27.7
	Greybull River at Otto bridge (sec. 22, T. 51 N., R. 95 W.)	54.2	4.0	0.0	13.4	+3.1	+26.3	+30.8
	Greybull River at lower bridge (sec. 7, T. 51 N., R. 94)	58.1	1.0	0.0	2.7	—0.3	+26.0	+30.5
	Greybull River at Skovgard's ranch (sec. 36, T. 52 N., R. 94 W.)	61.3	0.9	0.2	0.0	—0.3	+25.7	+30.2
	Greybull River below Payne ditch (sec. 25, T. 52 N., R. 94 W.)	63.7	0.5	0.0	0.7	+0.3	+26.0	+30.5
2	Greybull River at mouth	66.0	15.7	17.6	0.0	—2.4	+23.6	+45.7

NOTE.—The results of the two sets of measurements on Greybull River are so discrepant that it is believed the first set was affected by the almost daily rains that occurred on the headwaters, although an attempt was made to eliminate such effect.

WOOD RIVER

PLACE OF MEASUREMENT	Approximate distance	Amount in river	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
			Inflow	Diversions			
	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
July 30, 1920.							
Wood River above Cheese Mantle ditch	0.0	166.2					
Wood River at mouth	10.0	165.8	4.6	27.4	+22.4	+22.4	+22.4
August 30, 1920.							
Wood River above Hagberry No. 3 ditch	0.0	64.8					
Wood River below Last Chance ditch	3.5	95.2	0.0	0.7	+31.1	+31.1	+31.1
Wood River at lower end of slough	9.5	76.8	5.5	18.0	—5.9	+25.2	+25.2
Wood River at mouth	13.2	68.2	0.0	13.6	+5.0	+30.2	+30.2

LITTLE GOOSE CREEK

PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
			Inflow	Diversions			
	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
August 18, 1920.							
Little Goose Cr. above Last Chance ditch	0.0	37.1	......	......	......	......	......
Little Goose Cr. in sec. 30, T. 54 N., R. 84 W.	3 0	24.8	0.0	38.5	+26.2	+26.2	+26.2
Little Goose Cr. below Muskrat ditch	5.6	3.3	1.0	24.9	+2.4	+28.6	+28.6
Little Goose Cr. at Bighorn P. O.	7.9	4.7	0.0	3.6	+5.0	+33.6	+33.6
Little Goose Cr. below McCormick Cr.	10.7	8.2	3.1	4.5	+4.9	+38.5	+38.5
Little Goose Cr. below Burn Cleuch ditch	12.7	6.2	0.0	9.0	+7.0	+45.5	+45.5
Little Goose Cr. below Reed ditch	14.7	11.6	0.0	2.6	+8.0	+53.5	+53.5
Little Goose Cr. at mouth	16.8	12.7	0.0	2.3	+3.4	+56.9	+56.9
September 11, 1920.							
Little Goose Cr. above Last Chance ditch	0.0	29.4	......	......	......	......	......
Little Goose Cr., in sec. 30, T. 54 N., R. 84 W.	3.0	13.5	......	23.3	+7.4	+7.4	+7.4
Little Goose Cr. below Murkrat ditch	5.6	1.2	1.7	15.0	+1.0	+8.4	+8.4
Little Goose Cr. at Bighorn P. O.	7.9	7.7	0.4	0.6	+6.7	+15.1	+15.1
Little Goose Cr. below McCormick Cr.	10.7	7.4	3.4	4.2	+0.5	+15.6	+15.6
Little Goose Cr. below Burn Cleuch ditch	12.7	13.2	0 0	0.5	+6.3	+21.9	+21.9
Little Goose Cr. below Reed ditch	14.7	17.6	0.0	2.3	+6.7	+28.6	+28.6
Little Goose Cr. at mouth	16.8	16.4	0.0	1.3	+0.1	+28.7	+28.7

CLEAR CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
		Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
	August 12-15, 1920.							
Aug. 12	Clear Cr. in sec. 2, T. 50 N., R. 83 W.	0.0	86.4					
12	Clear Cr. below power house	2.5	87.9	0 0	1.9	+3.4	+3.4	+3.4
13	Clear Cr. at Buffalo	6.5	76.3	0.0	37.7	+26.1	+29.5	+29.5
13	Clear Cr. above Redman ditch	9.4	93.9	22.2	6.2	+1.6	+31.1	+34.9
14	do	9.4	93.9					
	Clear Cr. below Hopkins ditch	13.9	93.2	0.0	13.7	+13.0	+44.1	+47.9
	Clear Cr. below Watt ditch	18.5	85.5	0.0	14.8	+7.1	+51.2	+55.0
	Clear Cr. below Big Bonanza ditch	21.1	62.5	0.0	18.1	—4.9	+46.3	+50.1
	Clear Cr. above Piney ditch	25.7	70.3	0.0	0.0	+7.8	+54.1	+57.9
	Clear Cr. at Clearmont	35.2	66.5	16.7	11.7	—8.8	+45.3	+49.1
14	Clear Cr. below No. 3 ditch	37.7	45.5	0.0	16.5	—4.5	+40.8	+44.6
15	do	37.7	62.1					
	Clear Cr. below Cadiz ditch	42.4	55.8	0.0	5.9	—0.4	+40.4	+44.2
	September 20-21, 1920.							
Sept. 20	Clear Cr. below power house	2.5	33.6					
	Clear Creek at Buffalo	6.5	15.8	0.0	16.0	—1.8	—1.8	—1.8
	Clear Cr. below Redman ditch	10.4	39.6	20.5	1.1	+4.4	+2.6	+5.8
20	Clear Cr. above L. X. ditch	13.9	39.6	0.0	0.1	+0.1	+2.7	+5.9
21	do	13.9	39.0					
	Clear Cr. below Big Bonanza ditch	20.1	40.1	0.0	3.8	+4.9	+7.6	+10.8
	Clear Cr. above Piney Creek	25.7	36.0	0.0	0.0	—4.1	+3.5	+6.7
	Clear Cr. below Roberts ditch	30.4	58.0	18.9	0.0	+3.1	+6.6	+9.8
	Clear Cr. below No. 3 ditch	37.7	40.1	0.0	17.0	—0.9	+5.7	+8.9
21	Clear Cr. below Cadiz ditch	42.4	48.6	0.0	0.1	+8.6	+14.3	+17.5

ROCK CREEK

PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
			Inflow	Diversions			
August 13, 1920.	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
Rock Creek at junction of forks	0.0	71.5	......	......	......	......	......
Rock Creek below Lilly ditch	2.8	36.8	0.1	16.5	—18.3	—18.3	—18.3
Rock Creek below Last Chance ditch	4.3	11.4	0.3	35.3	+9.6	—8.7	—18.0
Rock Creek below Rounder ditch	7.0	9.7	0.0	4.5	+2.8	—5.9	—5.6
Rock Creek above Hill ditch	10.1	12.2	0.0	1.4	+3.9	—2.0	—1.7
Rock Creek at mouth	13.1	13.0	0.0	0.9	+1.7	—0.3	0.0
September 18, 1920.							
Rock Creek at junction of forks	0.0	8.3	......	......	......	......	......
Rock Creek below Lilly ditch	2.8	6.8	0.2	1.4	—0.3	—0.3	—0.3
Rock Creek below DeSmet canal	3.7	0.3	0.0	6.4	—0.1	—0.4	—0.4
Rock Creek below Rounder ditch	7.0	7.1	3.2	0.0	+3.6	+3.2	+3.7
Rock Creek above Hill ditch	10.1	8.7	0.0	0.1	+1.7	+4.9	+5.4
Rock Creek at mouth	13.1	6.9	0.0	0.0	—1.8	+3.1	+3.6

FRENCH CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	August 11-12, 1920.	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
Aug. 11	French Creek above Eagle Rock ditch	0.0	47.2					
11	French Cr. below Robbins ditch	3.1	24.1	0.0	27.1	+4.0	+4.0	+4.0
12	do	3.1	32.2					
	French Cr. below Mayhew and Meyer ditch	5.1	14.6	0.5	27.6	+9.5	+13.5	+14.0
	French Cr. below Dundee ditch	7.4	9.9	0.0	8.9	+4.2	+17.7	+17.7
12	French Cr. at mouth	8.9	13.2	5.5	5.1	+2.9	+20.6	+23.7
	September 17-18, 1920.							
Sept. 17	French Cr. above Brown and Forrester ditch	0.0	13.3					
	French Cr. below Robbins ditch	2.3	9.0	0.0	3.7	—0.6	—0.6	—0.6
17	French Cr. below Mayhew and Meyer ditch	4.3	4.5	0.0	6.1	+1.6	+1.0	+1.0
18	do	4.3	4.6					
	French Cr. below Dundee ditch	6.6	7.5	0.0	1.8	+4.7	+5.7	+5.7
18	French Cr. below Snyder ditch	7.3	6.8	1.2	0.4	—1.5	+4.2	+5.4

PINEY CREEK

Date	PLACE OF MEASUREMENT	Approximate distance	Amount in creek	Section		Section gain or loss	Total gain or loss	Seepage and surface waste
				Inflow	Diversions			
	August 16-17, 1920.	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec. ft.	Sec.-ft.
	North Piney Creek							
Aug. 16	No. Piney Cr. above Mead Cr. feeder	0.0	15.5					
	No. Piney Cr. at mouth	3.5	19.6	91.6	97.6	+10.1	+10.1	+11.6
	South Piney Creek							
16	So. Piney Cr. above Sherman & Wood ditch	0.0	130.5					
	So. Piney Cr. at mouth	2.5	36.0	0.0	115.1	+20.6	+20.6	+20.6
	Piney Creek							
17	Piney Creek at forks	0.0	55.6					
	Piney Creek at Kearney	3.8	57.6	2.2	0.4	+0.2	+0.2	+2.4
	Piney Creek below K. Z. ditch	6.8	53.8	3.2	1.2	—5.8	—5.6	—3.4
	Piney Cr. above Upper Flying E. ditch	9.1	52.1	0.0	6.9	+5.2	—0.4	+1.8
	Piney Creek below Flume ditch	12.0	45.4	0.0	7.0	+0.3	—0.1	+1.7
	Piney Creek below Althorp ditch	15.6	48.8	0.0	6.4	+9.8	+9.7	+11.9
	Piney Creek below Boxelder Creek	18.7	46.5	0.0	7.7	+5.4	+15.1	+17.3
17	Piney Creek at mouth	22.0	21.0	0.0	26.7	+1.2	+16.3	+18.5
	September 13-15, 1920.							
	North Piney Creek							
Sept. 13	No. Piney Creek at mouth of canyon	0.0	12.3					
	No. Piney Creek at mouth	4.0	32.8	48.8	28.4	+0.1	+0.1	+1.1
	South Piney Creek							
Sept. 14	So. Piney Cr. above Sherman & Wood ditch	0.0	40.2					
	So. Piney Creek at mouth	2.5	11.9	0.0	38.8	+10.5	+10.5	+11.5
	Piney Creek							
Sept. 14	Piney Creek at forks	0.0	34.5					
	Piney Creek at Kearney	3.8	35.3	1.0	0.3	+0.1	+0.1	+1.1
14	Piney Cr. above Upper Flying E. ditch	7.3	28.6	6.1	6.3	—6.5	—6.4	—5.4
15	Piney Cr. below Flume ditch	12.3	31.8	0.0	0.5	+3.7	—1.7	+0.7
	Piney Creek below Althorp ditch	17.3	33.1	0.0	0.5	+1.8	+0.1	+1.1
15	Piney Creek at mouth	22.0	24.5	1.0	13.8	+4.2	+4.3	+5.3

COMPARISON OF RESULTS ON PINEY CREEK

SECTION OF CREEK	Length of section	Gain or loss				
		July 30 to Aug. 2*	Aug. 16-17	Aug. 27 to Sept. 1*	Sept. 13-15	Sept. 27 to 30*
	Miles	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
North Piney Creek						
Above Mead Creek feeder to mouth	3.5	......	+10.1	+7.1	+0.1	—7.0
Total diversions	......	......	97.6	94.6	28.4	36.2
South Piney Creek						
Above Mead Cr. ditch to mouth	2.5	......	+20.6	+12.0	+9.7	+7.7
Total diversions	......	......	121.7	68.0	41.3	51.5
Piney Creek						
North and South forks to Kearney	3.8	......	+0.2	+1.9	+0.1	—2.7
Kearney to K. Z. ditch	3.0	+1.2	—5.8	—0.2	†	......
K. Z. ditch to Flying E. ditch	2.3	0.0	+5.2	+6.6	—6.5	......
Flying E. ditch to Flume ditch	2.9	+2.7	+0.3	+3.7	+3.7	......
Flume ditch to Althorp ditch	3.6	+12.3	+9.8	+14.1	+1.3	......
Althorp ditch to Boxelder Creek	3.1	+0.4	+5.4	—1.1	......	......
Boxelder Creek to mouth	3.3	+5.3	+1.9	+9.2	+3.5‡	......
Total gain or loss	22.0	+21.9	+16.3	+34.2	+4.3	......
Total diversions	......	46.3	56.3	59.5	21.4	......
Seepage percentage of diversions	......	47	29	57	20	......

*Measurements made by L. Z. Leiter Estate.
†Combined section Kearney to Flying E ditch.
‡Combined section Althorp ditch to mouth.